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Electric Utility Companies to Spend $8 Billion on New Transmission Facilities Through 1970

EEI's 1962 LBE Program

Research Activity for Development of Heat Storage Systems

Trends in Engineering Education and Their Impact on the Power Industry

K. L. Wheeler

PUBLISHED BY EDISON ELECTRIC INSTITUTE

ELECTRIC UTILITY INDUSTRY Statistics IN THE UNITED STATES

for APRIL 1961

Current Statistical Data Covering 100 Percent of Industry

(Includes Investor-Owned Companies, Cooperatives, and Government-Owned Utilities) — April, 1961

	Contiguous U. S. 1961	Contiguous U. S. 1960	%	Alaska and Hawaii, 1961
SOURCE AND DISPOSAL OF ENERGY				
NET GENERATION* (Kwhr in Thousands)				
By Fuel Burning Plants	47,440,331	45,477,900	+ 4.3	
By Water Power Plants	13,839,849	13,239,392	+ 4.5	
Total Net Generation	**61,280,180**	**58,717,292**	**+ 4.4**	
Net Imports from Canada and Mexico	286,632	381,919	— 24.9	
Purchases from Industrial Sources	144,180	230,889	— 37.6	
Energy Used by Producer	178,092	249,968‡	— 28.8	
Net Energy for Distribution	**61,532,900**	**59,080,132‡**	**+ 4.2**	
Energy Lost and Unaccounted for	4,164,372	3,302,252‡	+ 26.1	
Company Use and Free Service	156,849	166,423‡	— 5.8	
Sales to Ultimate Customers	**57,211,679**	**55,611,457‡**	**+ 2.9**	
CLASSIFICATION OF SALES†				
NUMBER OF CUSTOMERS—As of April 30, 1961	**1961**	**1960‡**		
Residential	51,617,042	50,534,373	+ 2.1	174,933
Commercial or Industrial:				
Small Light and Power	6,738,786	6,685,250	+ 0.8	30,039
Large Light and Power	525,255	445,351	+ 17.9	1,034
Other Customers	196,150	203,266	— 3.5	985
Total Ultimate Customers	**59,077,233**	**57,868,240**	**+ 2.1**	**206,991**
ENERGY SALES—During month of April (Kwhr in Thousands)				
Residential	17,012,591	16,270,456	+ 4.6	68,317
Commercial or Industrial:				
Small Light and Power	10,129,251	8,721,611	+ 16.1	40,019
Large Light and Power	27,668,381	28,446,245	— 2.7	68,393
Street and Highway Lighting	569,885	469,577	+ 21.4	2,934
Other Public Authorities	1,319,526	1,245,030	+ 6.0	693
Railroads and Railways	383,692	409,991	— 6.4	—
Interdepartmental	128,353	48,547	+164.4	540
Total to Ultimate Customers	**57,211,679**	**55,611,457**	**+ 2.9**	**180,896**
Revenue from Ultimate Customers (Thousands)	**$966,758**	**$928,340**	**+ 4.1**	**$4,802**
RESIDENTIAL SERVICE				
AVERAGE CUSTOMER DATA—for 12 months ended April 30. (New Series)				
Kilowatt-hours per Customer	3,897	3,718	+ 4.8	
Average Annual Bill	$95.87	$92.58	+ 3.6	
Revenue per Kilowatt-hour	2.46¢	2.49¢	— 1.2	

* By courtesy of the Federal Power Commission.

† To conform with the new FPC "Uniform System of Accounts," the data reported as "Rural" have been assigned to other appropriate classifications.

‡ Revised to reflect estimates for non-reported data not previously included, and adjustments to earlier estimates.

September, 1961

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The EDISON ELECTRIC INSTITUTE BULLETIN is published monthly, except bi-monthly in July and August, by the Edison Electric Institute, an association of electric light and power companies in the United States and its territorial possessions. Its affiliate members consist of investor-owned electric utilities in North, Central and South America and contiguous islands in the Western Hemisphere.

The objectives of the Edison Electric Institute are:

The advancement in the public service of the art of producing, transmitting, and distributing electricity and the promotion of scientific research in such field.

The ascertainment and making available to the members and the public of factual information, data, and statistics relating to the electric industry.

To aid its operating company members to generate and sell electric energy at the lowest possible price commensurate with safe and adequate service, giving due regard to the interests of consumer, investor, and employee.

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CONVENTIONS and MEETINGS

1961

September

10-13 Rocky Mountain Electrical League Annual Fall Convention, Jackson Lake Lodge, Moran, Wyo.

11-12 EEI-AGA Accounting Division and Section Organization Meetings, Netherland Hilton Hotel, Cincinnati, Ohio

11-12 EEI Electric Space Heating and Air Conditioning Committee, Dearborn Inn, Dearborn, Mich.

11-12 EEI Residential Promotion Committee, EEI Headquarters, New York City, N. Y.

13-14 EEI Sales Personnel and Training Committee, Cleveland, Ohio

13-15 EEI Farm Group, Belmont Plaza, New York City, N. Y.

14 Vermont Electrical Association Fall Outing, Lake Morey Inn, Fairlee, Vt.

14-15 BLBS Lighting Information Committee, Waldorf-Astoria, New York City, N. Y.

14-15 EEI Commercial Cooking and Water Heating Committee, Pick-Carter Hotel, Cleveland, Ohio

14-15 ASME-AIEE Engineering Management Conference, Roosevelt Hotel, New York City, N. Y.

14-16 Public Utilities Association of the Virginias Annual Meeting, White Sulphur Springs, W. Va.

18-19 EEI Commercial Lighting Committee, Dearborn Inn, Dearborn, Mich.

18-19 EEI Residential Electric Heating and Air Conditioning Committee, EEI Headquarters, New York City, N. Y.

20-21 EEI Street and Highway Lighting Committee, Hotel Statler, Buffalo, N. Y.

20-21 PIP 1961 Workshop Conference, Brown Palace Hotel, Denver, Colo.

20-22 IIFEUC Eighth Annual National Electric Farm Power Conference, Leamington Hotel, Minneapolis, Minn.

20-22 NELPA 5th Annual Meeting, Sheraton-Portland Hotel, Portland, Ore.

21-22 Missouri Valley Electrical Association Accounting Conference, Sheraton-Jefferson Hotel, St. Louis, Mo.

24-27 ASME-AIEE National Power Conference, Sir Francis Drake Hotel, San Francisco, Calif.

25-26 PEA Accident Prevention Committee, Philadelphia, Pa.

25-27 EEI Industrial Relations Committee 14th Annual Round Table Conference, Drake Hotel, Chicago, Ill.

25-27 EEI Meter and Service Committee, Leland Hotel, Springfield, Ill.

27-28 PEA Annual Meeting, Bellevue Stratford Hotel, Philadelphia, Pa.

27-29 EEI Industrial Power and Heating Group, Kenmore Hotel, Boston, Mass.

27-29 Missouri Valley Electrical Association Sales, Rural and Home Service Conference, President Hotel, Kansas City, Mo.

28-29 Southeastern Electric Exchange Accounting Section Conference, Atlanta Biltmore Hotel, Atlanta, Ga.

October

1- 7 Electric Council of New England Management Training Course, Bald Peak Colony Club, Melvin Village, N. H.

2- 3 Electric Council of New England Residential Sales Workshop, Hotel Wentworth-by-the-Sea, Portsmouth, N. H.

2- 3 Iowa Utilities Management Conference, Ft. Des Moines Hotel, Des Moines, Iowa

2- 4 EEI Prime Movers Committee, Continental-Denver Hotel, Denver, Colo.

4- 6 Indiana Electric Association, 52nd Annual Convention, Sheraton Hotel, French Lick, Ind.

11 BLBS Executive Committee, EEI Headquarters, New York City, N. Y.

12-13 EEI Transmission and Distribution Committee, Ft. Des Moines Hotel, Des Moines, Iowa

15-20 AIEE Fall General Meeting, Detroit, Mich.

15-20 National Safety Congress, Chicago, Ill.

16-18 NELPA Business Development Section Joint Meeting with Rate Research Committee and Public Relations and Advertising Committee, Davenport Hotel, Spokane, Wash.

18-19 Wisconsin Utilities Association Electric, Gas Operating and Sales Sections' Convention, Schroeder Hotel, Milwaukee, Wis.

18-20 Electric Council of New England 5th Annual Conference, Hotel Somerset, Boston, Mass.

23-24 EEI Electrical Systems and Equipment Committee, The Jack-Tar Hotel, San Francisco, Calif.

24-25 EEI Home Service Committee, Pick Congress Hotel, Chicago, Ill.

26-27 PCEA Hawaiian Conference, Princess Kaiulaui Hotel, Honolulu, Hawaii

26-27 Southeastern Electric Exchange Engineering and Operation Section Conference, Buena Vista Hotel, Biloxi, Miss. (Closed Session).

26-27 EEI Statistical Committee, The Homestead, Hot Springs, Va.

26-27 PEA Relay Committee, Hotel Penn Alto, Altoona, Pa.

30-Nov. 1 EEI Insurance Committee, Tides Hotel, St. Petersburg, Fla.

31 EEI Sales Division Executive Committee, Hotel Roosevelt, New York City, N. Y.

November

6- 8 EEI Accident Prevention Committee, Tutwiler Hotel, Birmingham, Ala.

9-11 PIP—1961 National Youth Conference on the Atom, The Palmer House, Chicago, Ill.

12-15 Air Conditioning and Refrigeration Institute Annual Meeting, The Homestead, Hot Springs, Va.

13-17 NEMA Annual Meeting, Traymore Hotel, Atlantic City, N. J.

14-15 EEI Eighth Annual Area Development Workshop, DuPont Plaza Hotel, Miami, Fla.

15-17 Southeastern Electric Exchange Sales Advertising and Public Relations Conference, Tides Hotel, St. Petersburg, Fla.

Electric Utility Companies to Spend $8 Billion on New Transmission Facilities Through 1970

THE nation's investor-owned electric utility companies plan to spend approximately $8 billion for new electric power transmission facilities through 1970, it was reported by Philip A. Fleger, President of the Edison Electric Institute, and Chairman of the Board and President, Duquesne Light Co., at a press conference in New York City on September 11.

With a present investment of $6.7 billion in transmission, the companies have made great strides in interconnecting electric power plants throughout the country, Mr. Fleger said. "Nearly all the electric power systems east of the Rocky Mountains, including 100 companies in 32 states, are now interconnected. West of the Rockies, interconnected service has been a fact for several years—both in the Pacific Northwest and the Pacific Southwest."

Complete Interconnection Under Way

Complete interconnection of the nation's power systems, the next step in the evolution of power supply in this country, is under way, Mr. Fleger stated. "By 1970 we expect all the major power systems to be capable of operating on an interconnected basis throughout the United States."

A two-year study by a task force of experts from the investor-owned electric companies shows how the nation's present high-voltage transmission system is being enlarged to meet growing demands for power in the most efficient and economical way, Mr. Fleger said. The forecasts show that electric utility companies estimate their net additional investment in transmission facilities, allowing for replacements, to be about $7.3 billion through 1970. Gross construction expenditures for transmission during the period will total about $8 billion. In 1970, the study indicates, total transmission investment of the investor-owned companies will be about $14 billion—more than twice the present total of $6.7 billion.

Describing the study, Charles E. Oakes, Chairman of the Board, Pennsylvania Power & Light Co., and Chairman of the EEI Committee on Power Capacity and Pooling, commented that many of the transmission lines now planned will operate at 345,000 volts. Some will be constructed so that they can be converted at a future date to 500,000-volt operation.

"Extensive research in even higher transmission voltages is being carried on," Mr. Oakes said. In particular, he cited experimental operation of lines as high as 775,000 volts. "The Pennsylvania Electric Company today is operating a 460,000-volt line as a regular part of its system," he pointed out.

Mr. Fleger said that electric companies have been spending a total of about $3.2 billion a year for new plant and equipment. "This is the equivalent of 10 percent of new construction for *all* American business," he said. "Clearly, our industry is making a substantial contribution to the economic well-being of the nation."

"With only about one-sixteenth of the world's population, our country now has about one-third of the world's power-producing capacity," Mr. Fleger stated. "We have more electric power capacity than the next five countries in the world combined."

Five Times Russia's Transmission Lines

"Although we have only about one-third the area of the Soviet Union, we have about five times the miles of transmission lines the Russians have," he said. "The United States is well ahead of the Soviet Union in production of electricity per capita. Russia's latest revised goals for power production aim at a per capita production of about 3,000 kilowatt-hours in 1970. Our production is expected to be around 7,500 kilowatt-hours per capita that year. It is difficult to see how Russia can catch up with us in the foreseeable future."

Following is the full text of remarks by Mr. Fleger and Mr. Oakes.

Remarks of Mr. Fleger

ABOUT four-fifths of America's electric power customers are now served by investor-owned electric companies. It is our job to make sure these customers continue to have all the electricity they need. I would like to discuss how we in the investor-owned companies go about doing this job, and particularly what we are doing to enlarge our present transmission system to meet the growing demand for power.

Since World War II, use of electricity in this country has been growing at an average rate of 8.6 percent a year. This is about two and one-half times the rate of growth of the whole economy, as measured by the Gross National Product. It is a record that has resulted from the increasing demands for electricity on the part of our customers, stimulated by the advertising and sales efforts of our companies, the manufacturers, and the appliance distributors. It has taken careful planning to build the generating plants, the transmission lines, and the distribution systems needed to produce and deliver these increasing amounts of energy, and this plant had to be built long before our customers even realized they needed or wanted more electricity.

Essentially, what happens is this: we plan to meet local needs. We build from the bottom up. We begin in the districts and divisions within each company's service area.

The next step is company-wide planning. Here the needs of the districts are coordinated and balanced. But, of course, we don't stop there. In most of the country we plan together, across corporate lines, on a regional basis. Then from all these plans that have been built up across the country, a national picture takes shape.

Any time you hear someone suggest that the growth of our electric power supply system should be initiated at the national level, you should realize that the suggestion means turning our present system of planning upside down. It would mean trying to start building a pyramid at its peak, rather than at its base.

Historically, the electric power system in this country has evolved in a simply-stated pattern. Capacity has been built to serve the needs of the people in the places they want to use it. A series of maps will serve to illustrate this point. Figure 1 shows the growth of high-voltage transmission lines in 1908, 1918, and 1928. During these years, backbone transmission was being built throughout the nation, but particularly in the East and on the West Coast—to bring power to the load centers.

The series of maps in Fig. 2 shows the rapid increase in transmission lines in 1940, 1950 and 1960. It also shows the increased demand for electricity, and the increased capability to meet that demand, during those years. The shaded area on the bars indicates the demand in the region. The remainder indicates the reserve margin.

Let us look at this growth in another way. In Fig. 3

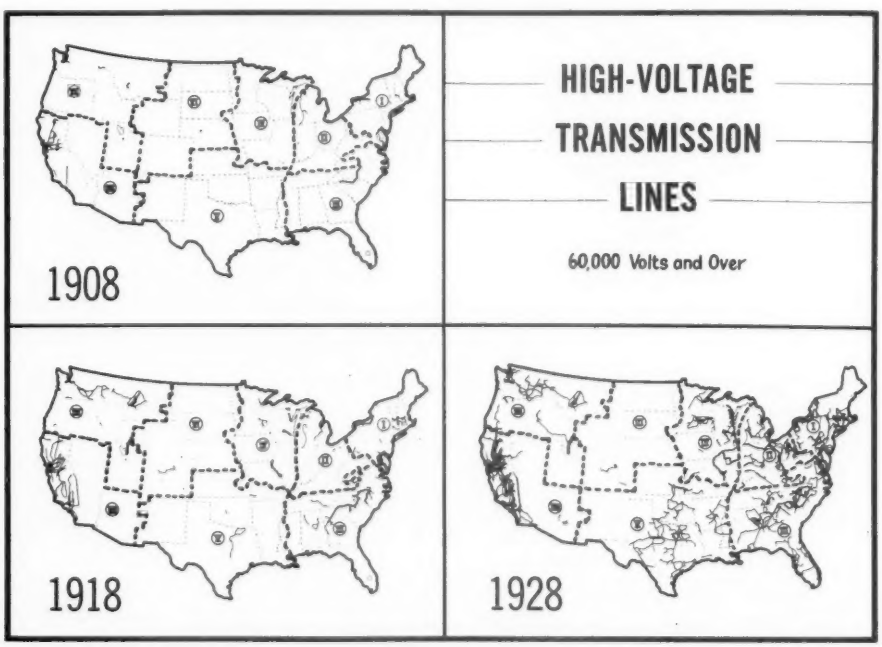


Figure 1

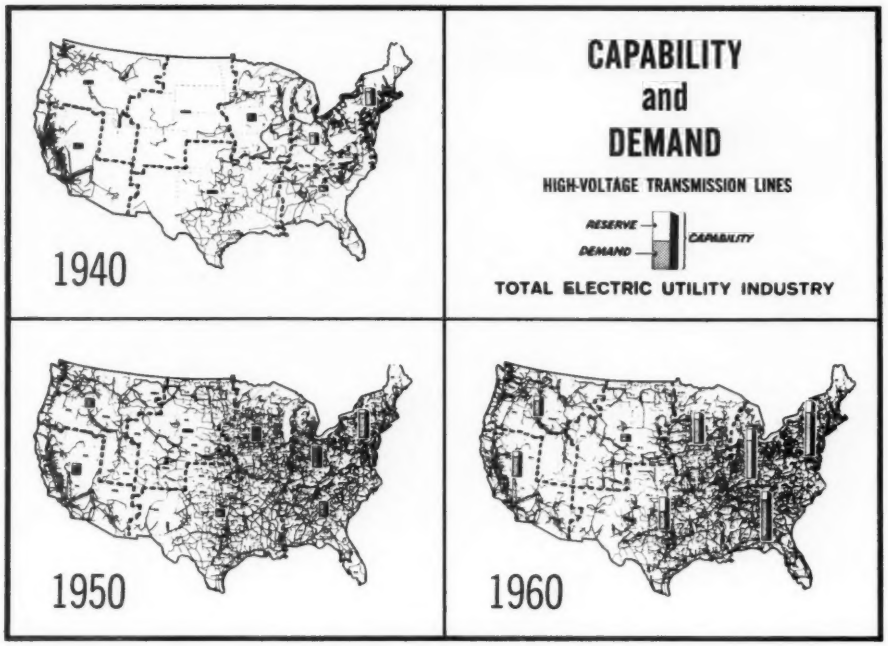


Figure 2

we see the growth in mileage of our transmission system, and, in the upper corner, the higher and higher voltages that have been achieved. These higher voltages are needed for transporting power to load centers, or in transmitting large blocks of power from strategically located plants to interconnected systems.

Many people are interested in knowing how our transmission system compares with that in the Soviet Union. Our latest information shows that, although we have only about one-third the area of the Soviet Union, we have about five times the miles of transmission lines the Russians have. (Fig. 4).

The maps and charts give an indication of the intricacy and the extent of the power supply system that has been built up in this country over the years. But what was it that determined where the building was to be done? The answer is: population. The transmission lines and power capacities in this country follow the population densities, as shown in Fig. 5.

Power plant capability has always been kept ahead of the demand for electricity. Transmission lines have brought the power to the people when and where they need it. With only about one-sixteenth of the world population, our country now has about one-third of the world's power-producing capacity. We have more electric power capacity than the next five countries in the world combined.

Production of electricity per capita in the United States is well ahead of the Soviet Union. Russia's latest revised goals for power production, shown in Fig. 6, aim at a per capita production of about 3,000 kilowatt-hours in 1970. Our production is expected to be around 7,500 kilowatt-hours per capita that year. It is difficult to see how Russia can catch up with us in the foreseeable future.

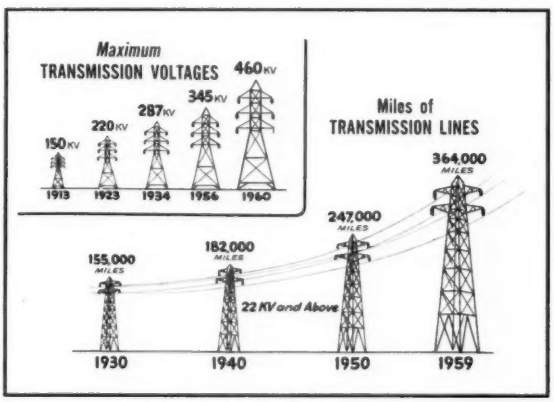


Figure 3

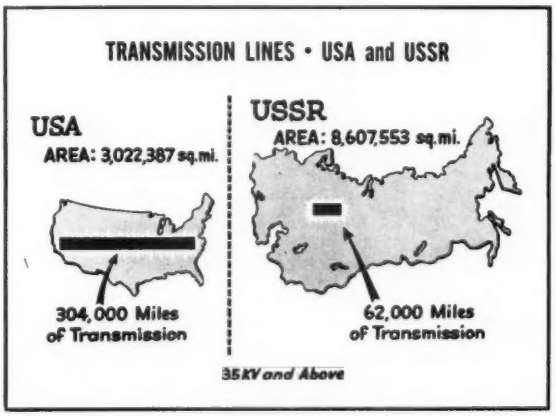


Figure 4

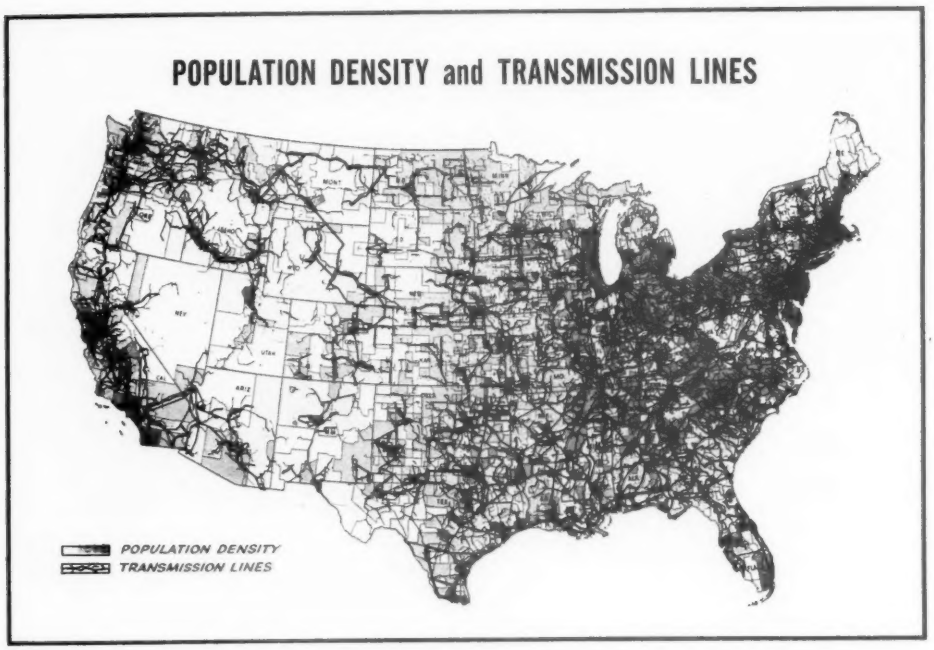


Figure 5

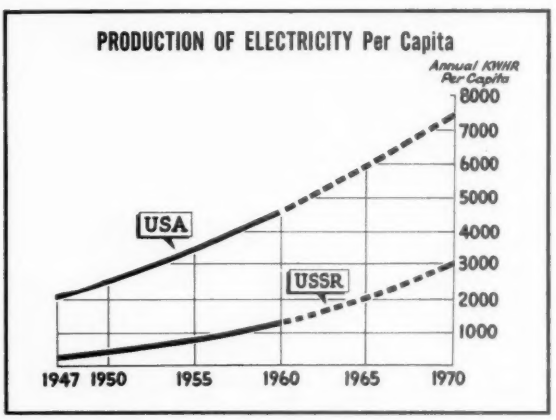


Figure 6

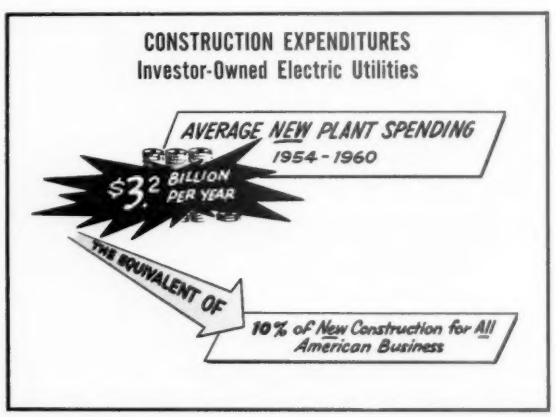


Figure 7

More than three-fourths of this power plant capacity in the United States is furnished by some 400 investor-owned companies. They have been spending about $3.2 billion a year for new plant and equipment (Fig. 7). This is the equivalent of 10 percent of new construction for *all* American business. Clearly, our industry is making a substantial contribution to the economic well-being of the nation.

In 1960, the companies spent about $3.3 billion. In 1961 it will be about $3.5 billion. As Fig. 8 shows, this annual spending for plant and equipment is the largest of all industries in America.

For the past two and one-half years, under the auspices of the EEI Committee on Power Capacity and Pooling, we have been developing a more complete picture of the electric companies' plans for the years ahead. By the year 2000, total power output for the United States will probably be in a range of six to 10 trillion kilowatt-hours, depending on the rate of growth of the national economy and the rate at which new energy uses are introduced (Fig. 9).

Of course, when we talk about a point as far distant as the year 2000, the figures must appear somewhat indistinct. As we discuss nearer points, we can be more sure of ourselves—and somewhat more detailed. In 1970 we expect the electric companies' peak load to have grown to 226.5 million kilowatts. By 1980, we expect it to be about 428.5 million kilowatts. That year, electric company capability will be about 492.6 million kilowatts (Fig. 10).

To provide the capability to meet this demand, the companies will have to continue adding new plant and equipment. We can expect that their total investment in electric plant will be $88 billion in 1970—nearly

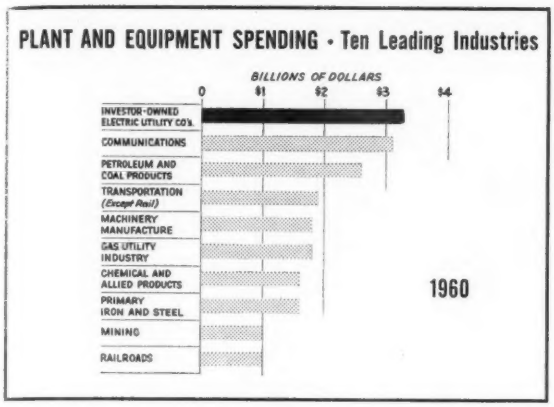


Figure 8

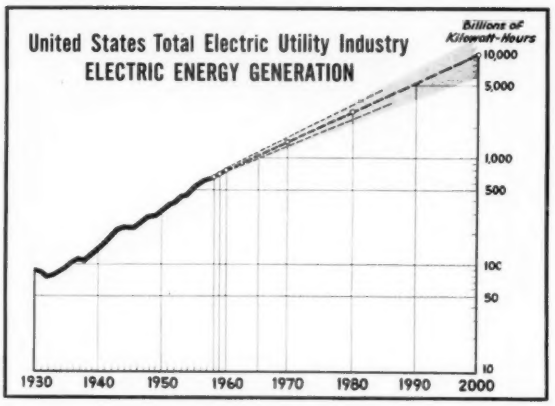


Figure 9

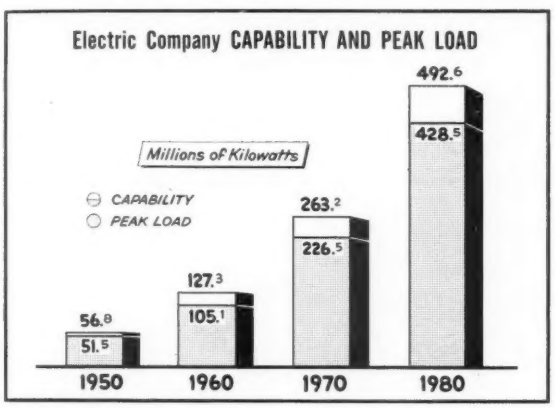


Figure 10

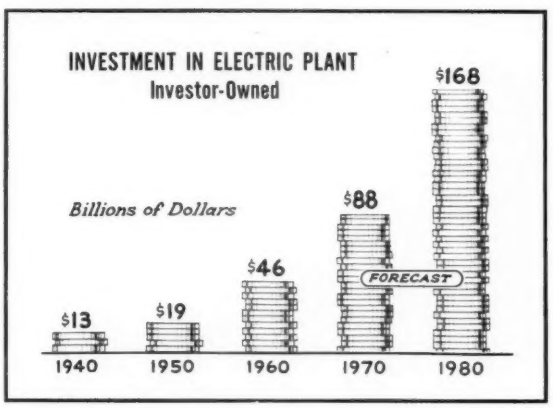


Figure 11

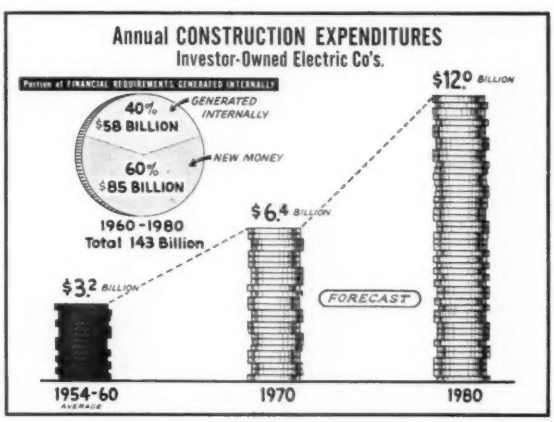


Figure 12

double the 1960 investment. Our forecasts show it will about double again by 1980 (Fig. 11). We estimate that expenditures for new construction will be at the rate of $6.4 billion per year by 1970 and $12.0 billion by 1980. As Fig. 12 indicates, we expect about half of the new investment will be generated internally. The balance will be new money.

As the study of the companies' plans has continued, the picture of what the power supply system of this country will look like in the year 1970 has become increasingly clear. To this end, the Committee on Power Capacity and Pooling has just completed a study of the transmission lines that are now planned for construction by 1970. Here are the results of that study.

The map in Fig. 13 shows the transmission lines in this country in 1960. It is substantially as the system exists today. Nearly all the electric power systems east of the Rocky Mountains, including 100 companies in 32 states, are now interconnected. West of the Rockies, interconnected operation has been a fact for several years—both in the Pacific Northwest and the Pacific Southwest.

By 1970 we expect all the major power systems to be capable of operating on an interconnected basis throughout the United States. The map on page 301 shows, in black, the transmission lines which the electric companies of this country expect to be built between now and 1970. Throughout the country, the trend to higher voltages will be continued.

To build the new transmission lines, the companies will spend a total of about $8 billion through 1970 (Fig.

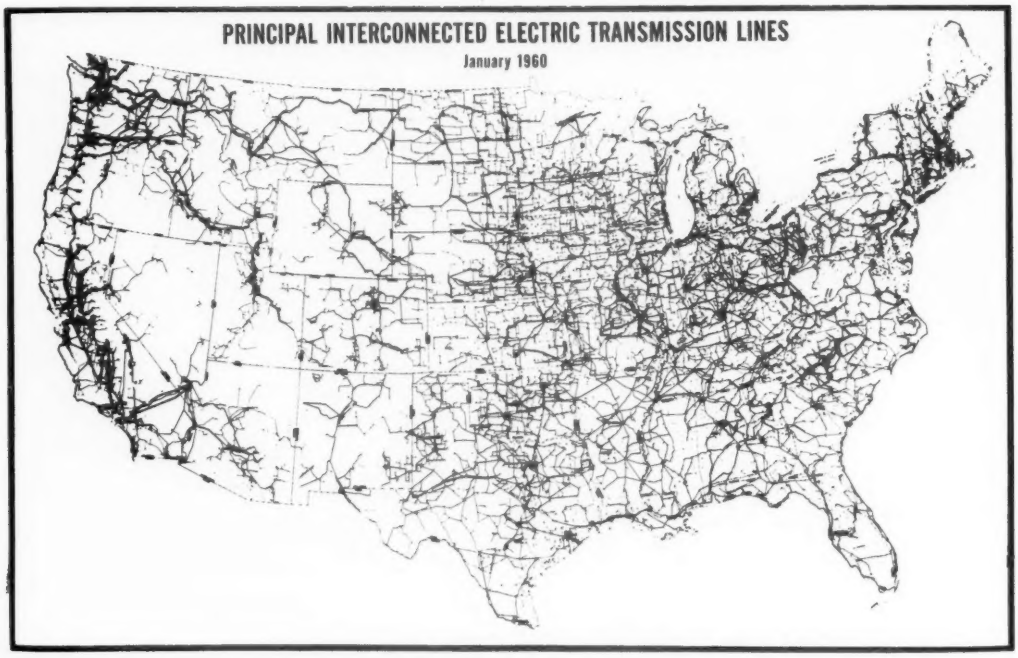


Figure 13

14). Present investment in transmission is about $6.7 billion. Allowing for replacement of equipment, by 1970 the companies' total investment in transmission facilities alone is estimated to be $14 billion.

The complete interconnection of the nation's power systems seems to be the next step in the evolution of power supply in this country. This process is underway and has been making rapid progress, as the map shown indicates. Greater strides are planned in order to provide pathways for new power capability of 136 million kilowatts in 10 years. Thus, we will be adding in the next 10 years more capability than the total we had in 1960—which took 80 years to accomplish.

Experience indicates that the bulk of the new transmission lines will be built by investor-owned companies and financed in the free market.

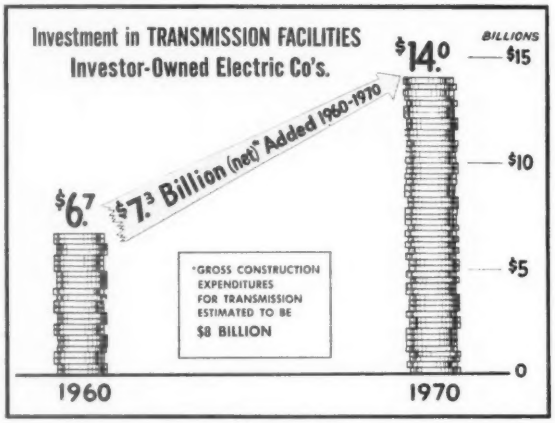
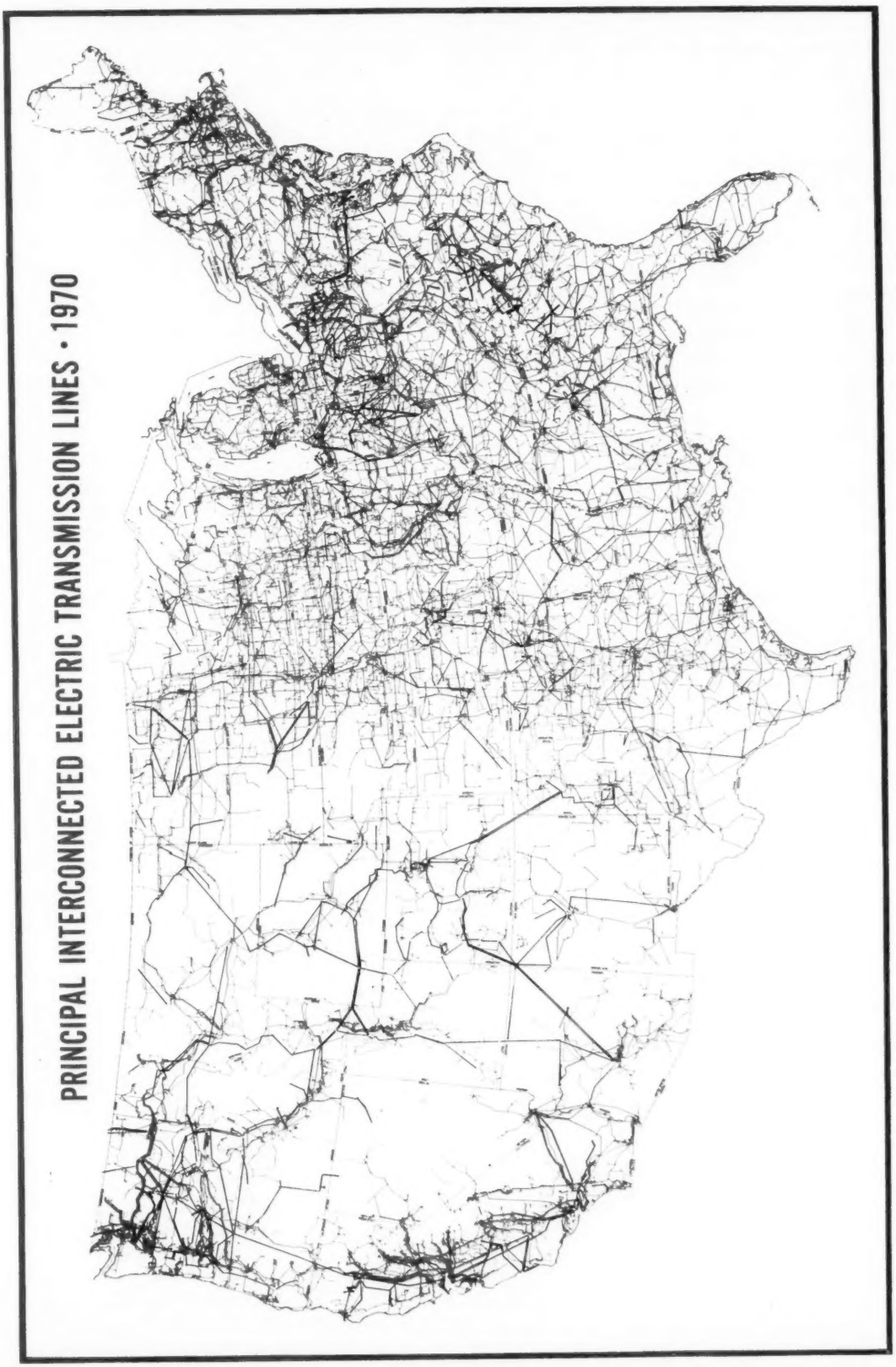


Figure 14

Remarks of Mr. Oakes

THE future transmission system shown in the map for 1970 (page 301) represents the combined and coordinated planning of the investor-owned electric utility companies to meet America's growing power needs. The best technical minds in our industry have worked on these combined plans. This has been a grass-roots study, made by experienced utility engineers who are familiar with the local and regional transmission requirements of our nation. As such, we believe it represents the best possible approach to providing the required transmission for the future. What we mean by required transmission is that investment in equipment and selection of voltages that will transmit power from the generating plants to load centers by the most economical and efficient methods.

Let me explain briefly how this map was developed. More than two years ago, a task force of experts from the electric companies divided the nation into several areas that conformed to either the Federal Power Commission's regional areas or subdivisions of these areas. After extensive consultation and research, the utilities in each of these areas drew up transmission plans for


PRINCIPAL INTERCONNECTED ELECTRIC TRANSMISSION LINES • 1970

the next 10 years. These were coordinated within the areas and with neighboring electric power companies in adjoining areas by the Task Force members. Finally, the material developed by the Task Force was coordinated at the Institute to produce the map.

Last year we completed an extensive study to determine the magnitude of future power loads and the best method of installing capacity to serve these loads. This study indicated that the estimated peak load of the investor-owned utility companies would be 226.5 million kilowatts in 1970—about double the existing load.

Building the transmission systems will enable the electric power companies to continue the established trend of installing larger, more efficient generating units, expanding their pooling arrangements, and increasing the interchange of energy so that America will continue to have abundant and reliable service in the most efficient and economical manner.

Investor-Owned Financing

By far the greater part of these lines will be built and financed by the investor-owned electric utility companies. However, there will be a few lines that Federal power agencies have already been authorized to build, and there are some others which we feel should be built—but we just don't know as of today who will finally build them.

The utilities of the United States originated the pooling idea many years ago, and they have developed it until nearly all sections of the country are benefiting. And this development is still going on. Nearly all of the present operating utilities are the result of integrating, over a 60-year period, hundreds of small isolated systems, physically combining them and pooling their resources. In addition to the integration that has resulted in the electric companies of today, many utilities have interconnected and pooled their generating facilities to obtain further economies.

My own company, Pennsylvania Power & Light Co., offers a good example of what has taken place many times over the years in this field. Step by step, more than 900 separate parts were consolidated to form Pennsylvania Power & Light Co., as it now exists.

Over 37 years ago, in 1924, Public Service Electric & Gas Co., Philadelphia Electric Co., and Pennsylvania Power & Light Co. pioneered an interconnecting, 220-000-volt backbone loop—the highest voltage in use at the time in this country.

Then, step by step, the present regional power pool, now consisting of 13 electric utility operating companies, with a total generating capability of more than 14½ million kilowatts, was developed. We have extensive plans to enlarge our pooling facilities and operations, which have proved to be very beneficial to the customers of all the participants.

Similar forward steps have been taken and are going on now all over the country. Here are a few recent examples:

Last March, Texas Power & Light Co. and three other Texas utilities announced plans for a 345,000-volt "power highway" that would link together 6,500,000 kilowatts of generating capability in the four companies.

In April, a group of electric companies in eight midwest and southwest states announced plans for building a "super power grid" involving at least 4,000 miles of 345,000-volt and 230,000-volt lines.

This June, Minnesota Power & Light Co. and two other midwest utilities announced plans for four major high-voltage interconnections that would cost more than $3,100,000.

New power pools are being formed, and old, informal arrangements are being expanded. Four investor-owned utilities and a cooperative system in the Midwest recently formed a pool called the Upper Mississippi Valley Power Pool to provide more efficient and economical operation by each participant in the pool. While pooling continues to grow, so do voltages.

Many of the future lines on the map for 1970 will operate at 345,000 volts. Some of these lines will be constructed so that they can be converted at a future date to 500,000-volt operation. Others will be at 230,000 or 115,000 volts, using the best voltage to fit into the needs of the systems involved. Almost all of the future lines on the map are of 115,000 volts or more. Keep in mind that we are talking only about principal transmission—major lines.

Extensive research in even higher transmission voltages is being carried on. For example, the American Electric Power Co. and Westinghouse Electric Corp., working with six other manufacturers, have been operating an experimental transmission line at 775,000 volts, the highest voltage in use in the world.

At Pittsfield, Mass., the General Electric Co. and the Western Massachusetts Electric Co. are testing a line in the 460 to 550 kilovolt range. Eventually, this will be raised to 750,000 volts.

The Public Service Co. of Colorado is testing a 500,-000 volt-line, while the Pennsylvania Electric Co. is operating a 460,000-volt line as a regular part of its system.

Transmission Investment to Double by 1970

It is estimated that the lines the companies plan to build in the next decade will require expenditures for construction of approximately $8 billion. The net additional investment in transmission facilities, allowing for replacements, is expected to be about $7.3 billion. By 1970, therefore, the total transmission investment of the investor-owned companies will be about $14 billion—more than twice the present total of $6.7 billion.

The expansion of the nation's transmission system to 1970 is a large and significant undertaking.

Primarily financed in the free market, the power system in the U. S. is the greatest in the world. Through advances in technology and as a result of the evolution in interconnection and pooling, this system is rapidly being expanded. The electric companies are fully prepared to meet all the power needs of all the American people—now and in the years to come.

Advantages of Electricity Stressed in EEI's 1962 LBE Program

$2.5 Million Advertising and Promotion Effort Has Five-Point Goal

EEI's $2.5 million Live Better Electrically program for 1962, outlined in a plan book which recently was distributed to the electric industry, will continue its clear, positive expression of the advantages of electricity over competing fuels.

Policy Statement

The LBE Statement of Policy sets forth the 1962 objectives of the program as follows:

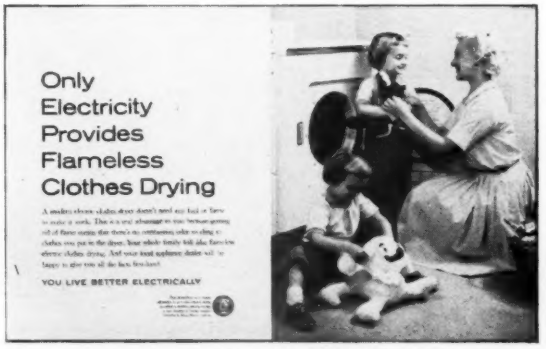
- Create customer preference for electrical use that is directly competitive with other fuels. This means selling the benefits of electricity and, with honesty and good taste, calling attention to the advantages of electricity as compared with its competitors. There shall be no direct or indirect reference to "safety," "safe," or danger to human life or property.
- For maximum effect, concentrate this effort on only the most critical competitive subjects which now are: range, water heater, dryer, heating and cooling, Gold Medallion Home.
- Blend Housepower and lighting into the advertising wherever possible.
- Provide for national coordination of the preference-building job with the local selling effort of member utilities.
- Multiply the effect of the program at all levels by encouraging cooperative effort by other electrical industry members.

Philip A. Fleger, EEI President and Chairman of the Board and President of Duquesne Light Co., in a message to the industry on the LBE program, said:

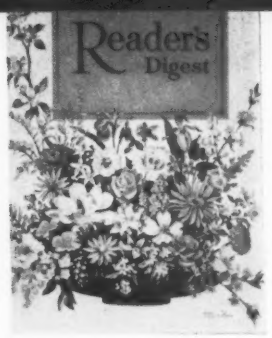
"In 1962, the Live Better Electrically program will continue to sell the concept of *total electric living* and the benefits that are derived therefrom. There is every reason to believe that the dollars contributed to support the program will produce even better results in 1962."

". . . The Live Better Electrically program does indeed serve to coordinate the selling efforts of the entire electrical industry—for all electric utilities, for all manufacturers of electrical equipment, and for all

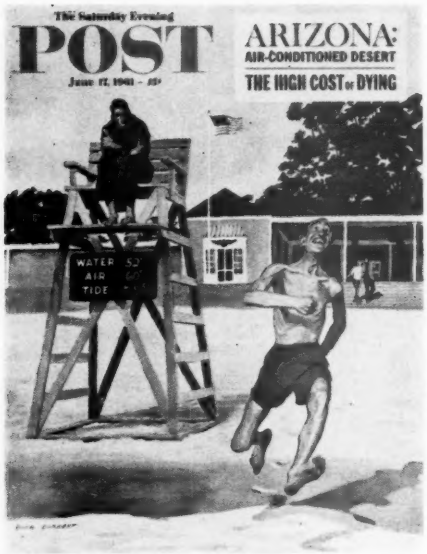
The Live Better Electrically advertising program for 1962 will spotlight flameless electrical appliances for the home, similar to those above. The word "flameless" will be featured prominently in every headline. The photograph will be in full color and of maximum size. The logotype will reinforce the theme, Live Better Electrically, and register its Gold Medallion symbol. These ads are to appear in three magazines.

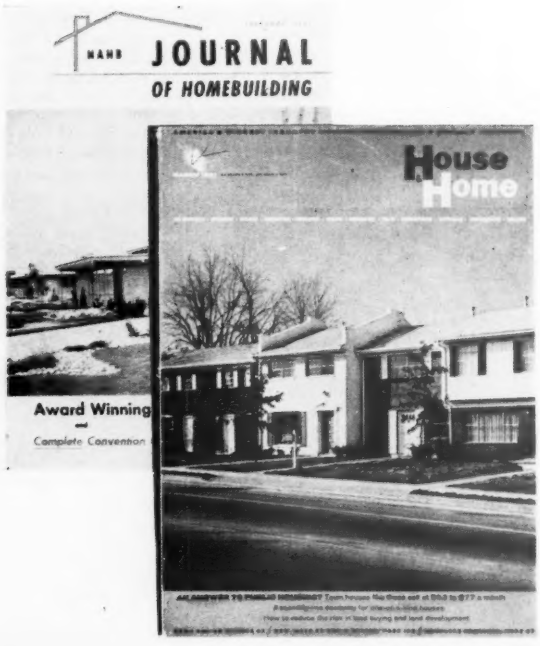


As in other appliance ads for the 1962 LBE advertising program, this one for electric clothes dryers draws upon human interest to make its point. The text of the ad points out that "Your whole family will like the ease and simplicity of a flameless electric clothes dryer." Twelve such ads will be run.



The magazines pictured on this and the opposite page will be utilized in the Live Better Electrically advertising program of EEI for 1962.





our valued trade allies. Here you will find the leadership and direction for effective projection of selling themes and basic selling approaches of value to your company."

Mr. Fleger summed up the message as follows:

"The aims and goals of the Live Better Electrically program are wholly desirable and totally practical. Its leadership has been demonstrated. It will be of direct benefit in your company's service area. I therefore urge the continued support of present Live Better Electrically participating companies. I also extend an invitation to all non-participating companies to join the program in what I genuinely believe to be their own self interests. The more united we are in its support, the more effective the program will be."

As in the past, the LBE advertising schedule for 1962 will be concentrated in a small number of wide-circulation family magazines, shelter magazines, and home building magazines.

Tear-Out Booklet

In the February, 1962, issue of *Reader's Digest*, an eight-page, tear-out booklet in four colors will tell more than 33 million readers about flameless electric house heating and air conditioning. This special LBE promotion has two objectives:

- To create immediate consumer desire for the benefits of electric house heating and air conditioning.
- To provide millions of homeowners with helpful, factual information on electric house heating and air conditioning.

In the *Reader's Digest* insert the five basic electric heating systems will be explained with supporting sketches: ceiling cable, baseboard, wall panel, heat pump, and electric furnace. The story of central air conditioning and of individual room units will be presented. The editorial-style article will also point out the importance of good insulation and humidity control.

Life, Saturday Evening Post, Better Homes and Gardens, and *American Home* are other consumer magazines which will be used to carry the LBE story in 1962. To reach the home building industry, the *NAHB Journal* and *House and Home* will be utilized.

Two-page spreads (a black-and-white page opposite a four-color page) will be used 12 times during the year to promote appliances—range, water heater, and dryer. *Life* will be used five times during the year; *Saturday Evening Post* four times; and *Better Homes and Gardens* three times for appliance advertising.

Thirteen two-page, black-and-white spreads will be devoted to selling Gold Medallion Homes, and 22 full-page, black-and-white pages have been scheduled for electric house heating advertising, in addition to the *Reader's Digest* insert. Fourteen insertions will be made in the trade journals.

Three valuable new promotion kits are being prepared for 1962, all featuring LBE's own "Dolly Flameless."

In the range promotion kit, "Dolly Flameless" puts across the LBE promotion theme—*flameless* electric

cooking is "clean." For dryers she announces that clothes from a flameless electric clothes dryer "smell fresh." The water heater kit points out that a flameless electric water heater has "stowability"; that it "fits anywhere without a flue."

All three kits have been designed for use in utility company showrooms and in dealer stores with maximum flexibility and effectiveness. Each kit contains horizontal and vertical window streamers, pennants, merchandise hang tags, "silent salesman" cards and price stickers, sample newspaper ads, plus designs for outdoor billboards.

W. M. Shepherd, Arkansas Power & Light Co., is Chairman of the EEI LBE Policy Committee; J. H. K. Shannahan, American Electric Power Co., Inc., is Chairman of the EEI LBE Planning Committee; and O. K. Leblanc, Louisiana Power & Light Co., is Chairman of the EEI LBE Copy Review Committee. These committees developed the 1962 program.

THE AMERICAN
HOME
Six rooms of beautiful colonial decorating
The street you'd love to live on
Picture guide to pruning shrubs
How to have a green lawn
At home with Senator Barry Goldwater
Six tempting fish dishes
Diet news

Participating Companies

The companies listed below are participating in the EEI Live Better Electrically program:

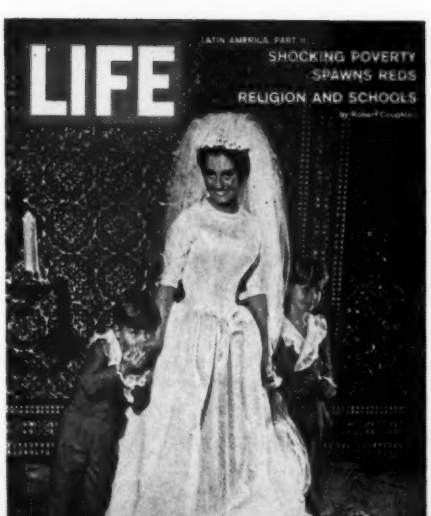
Allegheny Power System, Inc., Monongahela Power Co., Marietta Electric Co., Monterey Utilities Corp., West Maryland Power Co.; Potomac Edison Co., Northern Virginia Power Co., Potomac Light & Power Co., South Penn Power Co.; West Penn Power Co.; American Electric Power System, Appalachian Power Co., Indiana & Michigan Electric Co., Kentucky Power Co., Kingsport Utilities Inc., Ohio Power Co., Wheeling Electric Co.

Also, Arizona Public Service Co.; Atlantic City Electric Co.; Bangor Hydro-Electric Co.; Black Hills Power & Light Co.; Blackstone Valley Gas & Electric Co.; Boston Edison Co.; Brockton Edison Co.; Carolina Power & Light Co.; Central & South West Corp., Public Service Co. of Oklahoma, Southwestern Electric Power Co., West Texas Utilities Co.

Also, Central Hudson Gas & Electric Corp.; Central Illinois Public Service Co.; Central Louisiana Electric Co., Louisiana Rural Electric Corp.; Central Maine Power Co.; The Cleveland Electric Illuminating Co.; Colorado Central Power Co.; Columbus & Southern Ohio Electric Co.; Commonwealth Edison Co.; Community Public Service Co.; Concord Electric Co.; The Connecticut Light & Power Co.; Consumers Power Co.; Delaware Power & Light Co.; The Detroit Edison Co.; Duke Power Co.; Duquesne Light Co.; El Paso Electric Co.; Empire District Electric Co.

Also, Exeter & Hampton Electric Co.; Fall River Electric Light Co.; Fitchburg Gas & Electric Light Co.; Florida Power Corp.; General Public Utilities Corp., Jersey Central Power & Light Co., Metropolitan Edison Co., New Jersey Power & Light Co., Pennsylvania Electric Co.; Green Mountain Power Corp.;

(Continued on page 313)



The "traveling salesman" trailer of Central Illinois Public Service Co. is equipped with electric space heating equipment, and covers the 20,000-square-mile service area of the company.

'Traveling Salesman' Trailer Promotes Electric Heating

THE "traveling salesman" technique of by-gone days has been combined with modern highway transportation by Central Illinois Public Service Co. to promote electric space heating equipment to its customers.

CIPS wanted to do a "person-to-person" promotional effort, but its service area covers 20,000 square miles and 520 communities, with more than 400 of the towns having a population of less than 1,000.

Baseboard heating units, wall panels, ceiling cable, floor models, a central duct system, and an infrared unit are on display in the CIPS trailer. CIPS serves some 500 communities, 400 of which have 1000 population or less.

The solution was a specially designed, 32-foot trailer carrying displays of virtually every type of electric space heating equipment. In its travels from town to town in the CIPS service area, the trailer also serves as a moving billboard, since it carries the utility's signature and "electric heating display" in huge letters on its sides.

One man is assigned permanently to the trailer. It is his responsibility to keep the display in tip-top condition, and to see that the trailer arrives at its pre-scheduled destination. When the trailer arrives in a community for a showing, CIPS' commercial department representatives in that area take over to greet visitors and to explain operation of the space heating units. They also inform visitors on the utility's special, low rate for residential and commercial electric heating.

To Reach Thousands

Through use of the trailer, CIPS expects to reach thousands of additional electric space heating prospects, since many of the communities it serves do not yet have electric heating equipment dealers. The trailer also will be used to promote electric heating to dealers, builders, architects, and others associated in the building industry.

CIPS considers the trailer a major addition to its promotional program for full electrical living. It is being scheduled for showings at county fairs, home shows and similar gatherings, as well as on the "Main Street" of many communities.

Heated in the winter and cooled in the summer by two electric heat pumps, the trailer has on display baseboard heating units, wall panels, ceiling cable,

(Continued on page 310)

Second Phase Begins on Research Activity for Development of Heat Storage Systems

Progress Report by Joint AEIC-EEI Heat Pump Committee

THE second phase of the heat storage research project has begun. The Joint AEIC-EEI Committee recommended to the Executive Committee of the AEIC and to the EEI Board of Directors that Comstock and Wescott, Inc., be engaged to perform research and development on the addition of "boiling-point-raisers" to the unpressurized water systems, and on heat of fusion systems. These recommendations were approved, and the necessary funds were authorized by the Executive Committee of AEIC in October, 1960, and by the EEI Board of Directors in March, 1961. In May of this year a contract was signed with Comstock and Wescott, Inc., and laboratory analyses are now in progress that are expected to be completed by the summer of next year.

Extensive Investigation

The awarding of this contract to Comstock and Wescott, Inc., is a result of extensive investigations by the joint committee into the feasibility of developing an inexpensive and safe means of storing heat for supplemental use in conjunction with electric space heating, and into the ultimate benefits which could accrue to the electric utility industry through development of such a heat storage system.

Following completion of the first phase of the heat-storage research project, reported in the June, 1959, issue of the EEI BULLETIN, the joint committee solicited proposals from nine research organizations to continue the work and received replies from six of them. Before making a final recommendation, the joint committee authorized Comstock and Wescott, Inc., to explore, over a wide range of requirements, the physical and economic features of the more promising heat storage materials in relation to those of water. The committee felt that a preliminary exploration was needed because recent information indicated the possibility that a 400,000 Btu heat storage capacity would be sufficient in certain climatological areas where it was thought originally that a 1.5 million Btu capacity was needed. With such reduced capacity requirements, it was felt that some forms of unpressurized water systems might become acceptable for a segment of the potential market which could utilize small heat storage units.

C&W's analysis showed that where relatively low heat storage capacity will suffice (below one-half million Btu), and high capacity per unit volume is not needed, a heat storage system based on unpressurized water is indicated. The range of the water system, it was indicated, might be increased somewhat (up to 1 million Btu), if "boiling-point-raisers" could be added to increase the volumetric efficiency. For higher capacity, where the size of the system becomes a factor, it was concluded that the best choices are the heat of fusion system and the hydration system, using, re-

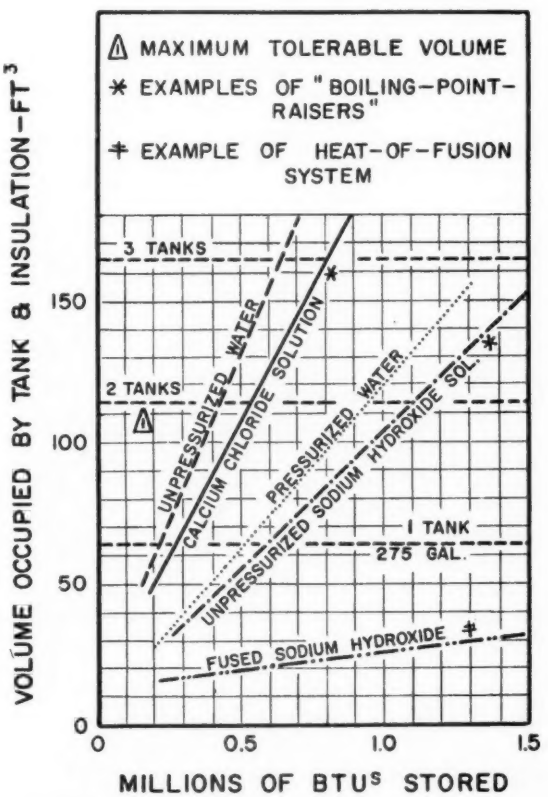


Figure 1 — Volume of Heat Storage Systems

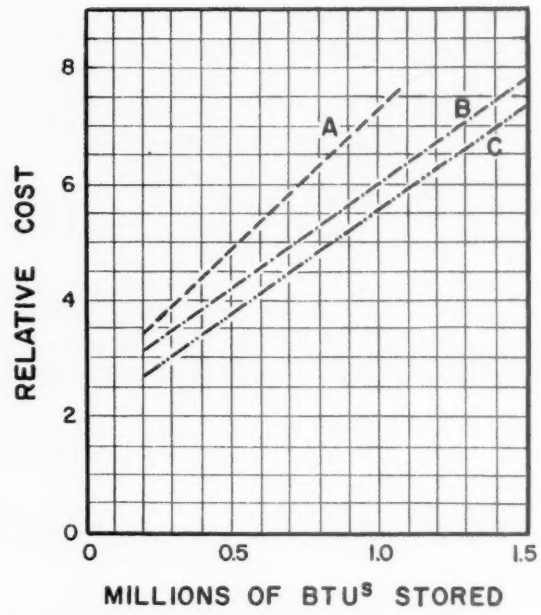


Figure 2—Relative Cost of Heat Storage Systems
A—Unpressurized water (achievable relatively soon.)
B—Unpressurized sodium hydroxide solution (achievable after more development.)
C—Fixed sodium hydroxide (achievable ultimately, after extensive development.)

spectively, sodium hydroxide and calcium oxide, for example.

Fig. 1, which is reproduced from C&W's report, illustrates a comparison of volume requirements of different heat storage materials in relation to that of water for a wide range of heat storage capacity requirements. As a basic criterion, C&W believes that two 275-gallon tanks, side-by-side, surrounded by an insulating jacket about 4" thick—for a total volume at approximately 115 cubic feet—is the maximum tolerable limit for the volume of a residential heat storage system. For heat storage capacity requirements up to 400,000 Btu, it may be seen from this figure that the unpressurized water system is well within the tolerable volume limit. The addition of "boiling-point-raisers" to the unpressurized water system would make it suitable for capacity requirements up to a million Btu without excessive volume. However, to meet larger requirements, it may be seen that it will be necessary to develop one of the systems with higher capacity per unit volume.

The cost of the heat storage systems will certainly be an important consideration. The system must be designed so that its annual cost does not exceed the savings obtained by its use. Although an accurate determination of the eventual cost of mass production of such systems cannot be given at this time, C&W has prepared estimates of the relative costs of the unpressurized water system, with and without a "boiling-point-raiser," and a heat of fusion system such as that employing sodium hydroxide. These costs are reproduced in Fig. 2. For heat storage capacity requirements of around 400,000 Btu, the unpressurized water system, which has been already developed, will not cost much more than either the unpressurized water system with a "boiling-point-raiser" or the heat of fusion system using sodium hydroxide. However, for heat storage capacity requirements in the neighborhood of 1 million Btu and over, the cost of the unpressurized water system becomes excessive, and development of a heat storage system with high capacity per unit volume becomes necessary.

Work to Be Performed by C&W

In carrying out this second phase of the heat storage project, C&W will use both experimental and theoretical methods. Specifically, the object of the work on the water system will be to search out the most suitable substances for use as "boiling-point-raisers"; uncover the technical and economic factors which the use of these substances would introduce; evaluate and weigh these factors against the advantages which would be gained by their use as "boiling-point-raisers"; and, finally, determine whether the use of any such material in a heat storage system is warranted.

The object of the program on the heat of fusion system will be to determine the most suitable material or materials for use as a heat storage medium in a system based on the heat-of-fusion principle, taking into account the problems associated with corrosion, heat exchange, safety, controls, insulation and containers. Recommendations will be made for subsequent steps leading to designs for a practical heat storage system.

It is hoped that the results of this research program, supplemented by concurrent investigations on other facets of the unpressurized water systems by utilities and manufacturers, will facilitate the development of acceptable means to meet the needs of the low capacity heat storage systems (below 1 million Btu) and will lay the groundwork for future development of systems to meet the requirements for larger capacity.

Members of the Joint AEIC-EEI Heat Pump Committee are: Chairman, E. R. Ambrose, American Electric Power Service Corp.; C. W. Bary, Philadelphia Electric Co.; C. M. Boardman, Duquesne Light Co.; H. F. Carr, Baltimore Gas and Electric Co.; B. A. Dmitrieff, Consolidated Edison Co. of New York, Inc.; P. R. Dwyer, The Detroit Edison Co.; R. F. Forbes, Indianapolis Power & Light Co.; G. G. Freyder, Commonwealth Edison Co.

Also, T. W. Fuller, Pacific Gas and Electric Co.; E. L. Gates, Middle West Service Co.; T. B. Knox, Virginia Electric and Power Co.; G. W. McElhaney, Ohio Edison Co.; J. W. Megley, Boston Edison Co.; G. M. Nash, Central Hudson Gas & Electric Corp.; C. H. Randolph, Wisconsin Electric Power Co.; Acting Secretary, G. S. Landrith, Jr., Edison Electric Institute.

Members of the Steering Committee of the Heat Storage Research Project are: Chairman, C. W. Bary; E. R. Ambrose; and G. M. Nash.

Industrial Relations Round Table Conference to Be Held Sept. 25-27

THE 14th Annual Round Table Conference of the EEI Industrial Relations Committee will be held at the Drake Hotel in Chicago, Sept. 25-27.

Under the general theme of "Evaluating Individual and Company Responsibilities," conference discussion groups will consider the responsibility of employees at all levels in the company organization for his company's success and his own growth.

Dewitt Pike, Vice President of the Rochester Gas and Electric Corp., is Chairman of this year's conference, and the delegates will be welcomed by C. E. Parker, Manager of Industrial Relations, Commonwealth Edison Co., and Chairman of the Institute's Industrial Relations Committee.

Four keynote speakers will consider the employee's responsibility for the cost of manpower, for his own security, for leadership by first-line supervisors, and for middle management development. The keynote speakers will be F. L. Larkin, Vice President of Wisconsin Electric Power Co.; A. L. Clark, Personnel Director of Virginia Electric and Power Co.; F. M. Osta, Vice President of Niagara Mohawk Power Corp.; and R. H. Sessions, Personnel Director of Idaho Power Co.

EEI President Philip A. Fleger, Chairman of the Board and President of Duquesne Light Co., will address the luncheon on Monday. J. B. Thomas, Chairman of the Board of the Texas Electric Service Co., and A. A. Cree, President of Central Vermont Public Service Corp., will speak to the delegates on the following days.

One of the unique features of the Round Table Conference is the group discussions of the keynote subjects. Twenty-eight experienced conference leaders representing every geographical area in the country will serve as leaders for these conferences and will summarize the findings of their group. Conference leaders and their subjects will be as follow:

Cost of Manpower—Whose Responsibility?—M. S. Bateman, Training Supervisor, Utah Power & Light Co.; G. Brown, Industrial Relations Manager, Long Island Lighting Co.; J. F. Dahlberg, Manager of Employee Training and Accident Prevention, Wisconsin Electric Power Co.; C. H. Faulkner, Labor Relations Administrator, Southern California Edison Co.; E. L. Gerber, Vice President, Personnel and Public Relations, Atlantic City Electric Co.; R. J. Lyman, Director of Personnel, New England Electric System; R. W. Scherer, Assistant to Vice President, Georgia Power Co.; C. H. Schultz, Director, Industrial Relations, Wisconsin Michigan Power Co.

Self-Security—Whose Responsibility?—R. M. Bigwood, Personnel Director, Otter Tail Power Co.; O. H. Broadway, Assistant Manager, District Operations Department, Carolina Power & Light Co.; M. F. Bunnell, Vice President, Florida Power Corp.; P. L. Gunn, Director, Employee Relations, Southwestern Electric Power Co.; W. K. Huggler, Assistant Industrial Relations Manager, Gas Department, Public Service Electric and Gas Co.; F. W. Keith, Director of Personnel, The Toledo Edison Co.; V. J. Thompson, Manager of Industrial Relations, Pacific Gas and Electric Co.; W. P. Walker, Supervisor of Personnel Development, New York State Electric & Gas Corp.

Leadership by First-Line Supervisors—Whose Responsibility?—K. Austin, Director of Personnel, Duke Power Co.; L. W. Esten, Vice President and Treasurer, Central Illinois Electric and Gas Co.; J. T. King, Research Supervisor, Baltimore Gas and Electric Co.; M. A. Kirk, Manager, Personnel and Safety Department, Central Illinois Public Service Co.; M. B. Mathis, Assistant Director of Employee Relations, Union Electric Co.; J. O. Parker, Manager of Employment and Research, Central Hudson Gas & Electric Corp.; W. F. Schonhart, System Training Supervisor, Niagara Mohawk Power Corp.; C. P. Shirey, Training and Safety Manager, Gulf States Utilities Co.

Middle Management Development—Whose Responsibility?—C. P. Anderson, Personnel Director, Orange and Rockland Utilities, Inc.; J. Boulet, Manager, Employee Development, Arizona Public Service Co.; J. F. Cheston, Personnel Staff Assistant, Potomac Electric Power Co.; C. W. Cornforth, Assistant Industrial Relations Manager, Public Service Electric and Gas Co.; J. R. Maher, Employment and Training Manager, The Connecticut Light & Power Co.; D. G. Schroeder, Assistant Personnel Director, Interstate Power Co.; D. C. Wester, Director, Employee Relations, Kentucky Utilities Co.; F. E. Winchester, Personnel Relations Specialist, NEGEA Service Corp.

The panel discussion on Tuesday night will consider factors in the 1961 labor climate. Members of the panel are J. E. Teagan, Vice President of the New England Electric System; Justin Rogers, Coordinator, Ohio Edison Co.; and T. C. Kammholz, Partner, Vedder, Price, Kaufman, and Kammholz, and also former general counsel of National Labor Relations Board.

Each year more member companies participate in this annual event, and a record attendance is expected at the Drake Hotel in September for this important conference.

Youth Conference on the Atom Planned Nov. 9-11 in Chicago

FIFTY investor-owned electric utility companies throughout the United States are expected to send more than 500 high school science students and their teachers to the 1961 National Youth Conference on the Atom, to be held at the Palmer House in Chicago, Nov. 9-11.

Each electric company will sponsor a delegation of high school students who have excelled in science. These students and their teachers are chosen by local education officials through competitive examination, scholastic achievements, or some other acceptable standards, and are then sent to Chicago as guests of their local electric company.

The purpose of the conference is to present to a group of the nation's most able high school science students and teachers an authoritative and inspiring picture of the promise of the peaceful atom in its various applications, and to help advance interest in the study of science in the United States.

The 1961 conference is co-sponsored by the National Science Teachers Association and the Future Scientists of America Foundation. At least 14 other prominent national scientific and academic organizations and institutions are supporting the conference. These include: American Association for the Advancement of Science; American Nuclear Society; American Institute of Physics; Argonne National Laboratory; Armour Research Foundation; Atomic Energy Commission; Atomic Industrial Forum; Brookhaven National Laboratory; Illinois Institute of Technology; Museum of Science and Industry; National Aeronautics and Space Administration; Northwestern University; Science Clubs of America; and The University of Chicago.

The conference has been endorsed by the United States Commissioner of Education.

Speakers at the conference will include some of the most prominent scientists and educators in America and the world.

Dr. H. A. Bethe of the Laboratory for Nuclear Studies at Cornell University will deliver the keynote address. Dr. G. T. Seaborg, Chairman of the U. S. Atomic Energy Commission, will be the dinner speaker on the evening of Nov. 9.

M. L. Kapp, President, Interstate Power Co., and Chairman of the Steering Committee of the Electric Companies Public Information Program, will be General Chairman of the conference. Murray Joslin, Vice President, Commonwealth Edison Co., will welcome the delegates.

The conference program will be strictly a scientific and educational one. Subjects will range from the physical to the biological sciences, with emphasis on pure research and the accumulation of new knowledge. All peaceful aspects of the atom will be covered.

Trailer Promotes Electric Heating

(Continued from page 306)

floor models, a central duct system and an infrared unit. All but the duct system are "live" displays so that trailer visitors can actually see and feel how the different types of units operate.

One of the few mobile displays of its type in the United States, the utility's "traveling salesman" was conceived at CIPS' general office in Springfield, Ill. It represents the combined engineering and creative talents of several departments, under the general supervision of B. L. "Barney" Palm, Commercial Department Manager.

With sketches, drawings and dimensions, Mr. Palm and his co-workers took their problem to the Branstrator Engineering Corp. of Fort Wayne, Ind., nationally known builder of house trailers and custom-designed commercial units. Branstrator produced the finished product in accordance with the CIPS design.

In addition to the space heating units on display, the trailer also has cutaway models showing the proper insulation for both regular construction and concrete slab floor construction.

The trailer has an attractive lounge area, partially partitioned by grillwork, where prospective electric heating customers may discuss their own heating plans with a CIPS representative.

For an attention-getter outside and to provide a pleasing atmosphere inside, the CIPS planners equipped the trailer with a stereophonic tape recorder for music, with exterior and interior speakers.

The well-lighted mobile unit has 14 troffers holding 56, 40-watt fluorescent tubes with a maximum light intensity of 200 footcandles. The lighting system is equipped with 'Hollophane' plastic diffusers to provide soft, glare-free light. It also features three dimming devices to control levels of illumination.

In addition, the trailer features 20 lighted color transparencies of electric heating installations in various parts of the CIPS service area.

Some of the investor-owned electric utility company commercial sales representatives attending the EEI-sponsored Commercial Cooking School at the Culinary Institute of America are shown above. Clockwise, the salesmen are: John Pohl, Commonwealth Edison Co.; A. W. Steffy, Metropolitan Edison Co.; G. G. Gardner, Public Service Co. (Commonwealth Edison); L. A. Crittenden, Pennsylvania Electric Co.; G. E. Parks, Metropolitan Edison Co.; R. E. Wilson, Consumers Power Co.; Spiro Vardakas, The United Illuminating Co.; L. A. Barnard, Pennsylvania Electric Co.; Robert Stoffan, The United Illuminating Co.; Joseph Amendola, in charge of bake shop instruction at the Culinary Institute of America; F. D. Sisson, Columbus and Southern Ohio Electric Co.; R. L. Grennan, Public Service Co. (Commonwealth Edison); and J. E. DuCharme, Consumers Power Co.

Commercial Salesmen Go to School to Learn Use of Cooking Equipment

COMMERCIAL salesmen from 27 investor-owned electric utility companies recently attended an EEI-sponsored electric cooking school so they could get first-hand experience with the quantity cooking equipment they sell.

School Held at Culinary Institute

The school was held June 19-23, at the Culinary Institute of America, New Haven, Conn. Morning sessions were devoted to training in the fundamentals of quantity food preparation, lectures, demonstrations of cooking and baking principles, and the use of food service equipment. As part of the instruction the sales personnel prepared their own breakfasts and luncheons.

In the afternoons the salesmen attended lectures and participated in group discussions dealing with the merchandising aspects of electric cooking equipment for quantity food service operations. The course in-

C. D. Lawrence, New England Electric System, Chairman of the EEI Sales Division Executive and Sales Division Advisory Committees, addresses the graduation luncheon for electric utility sales representatives at the EEI Commercial Cooking School. From left, seated, are: J. D. Waldner, EEI staff; S. F. MacLean, The United Illuminating Co., Chairman of the Cooking School Program Committee; R. L. Noble, Massachusetts Electric Co.; and Paul Fairbrook, Dean of the Culinary Institute, where the cooking school was held.

Spiro Vardakas, The United Illuminating Co., places a pie in oven under supervision of Joseph Amendola, bake shop supervisor at the Culinary Institute in New Haven, Conn.

The Commercial Cooking & Water Heating Committee
of
Edison Electric Institute
Certifies that

has satisfactorily completed the
1961 COMMERCIAL COOKING SCHOOL
& SALES WORKSHOP
conducted in cooperation with
The Culinary Institute of America, Inc.

Commercial Director
Edison Electric Institute

Dean
The Culinary Institute of America, Inc.

June 23, 1961

This is the certificate which was awarded to each of the "graduates" of the Culinary Institute. Thirty-eight electric company personnel attended the week-long cooking school.

cluded talks, panel discussions and meeting with equipment manufacturers' representatives, chefs, and food service executives.

C. D. Lawrence, New England Electric System, Chairman of the EEI Sales Division Executive and Sales Division Advisory Committees, addressed the sales personnel.

The school was sponsored by the EEI Commercial Cooking and Water Heating Committee, in cooperation with the Culinary Institute. The committee is headed by J. C. Newhouse, Northern States Power Co.

The following attended the cooking school:

R. G. Abair, Western Massachusetts Electric Co.; George Abraham, The Toledo Edison Co.; E. F. Baker, Narragansett Electric Co.; L. A. Barnard, Pennsylvania Electric Co.; L. A. Castagneto, Suburban Electric Co.; A. S. Coffin, Public Service Co. of Indiana; R. Cooper, Jersey Central Power & Light Co.

Also, L. A. Crittenden, Pennsylvania Electric Co.; J. E. DuCharme, Consumers Power Co.; L. Duckworth, New Jersey Power & Light Co.; R. M. Everson, Narragansett Electric Co.; L. J. Flynn, Massachusetts Electric Co.

Also, G. G. Gardner, Public Service Co. (Commonwealth Edison); H. P. Gillingham, Philadelphia Electric Co.; R. L. Grennan, Public Service Co. (Commonwealth Edison); G. E. Hovis, Florida Power Corp.; J. Z. James, Narragansett Electric Co.; W. K. Lewellen, Suburban Electric Co.; D. A. Loy, Appalachian Power Co.; B. F. Lyth, Jr., Niagara Mohawk Power Corp.; J. P. McCurdy, Philadelphia Electric Co.; C. J. McGinnis, Central Vermont Public Service Corp.; S. P. MacLean, The United Illuminating Co.

Also, G. E. Parks, Metropolitan Edison Co.; John Pohl, Commonwealth Edison Co.; W. H. Roll, West Penn Power Co.; C. H. Shafer, Central Illinois Public Service Co.; R. G. Sheahan, The Cleveland Electric Illuminating Co.; F. D. Sisson, Columbus and Southern Ohio Electric Co.; A. W. Steffy, Metropolitan Edison Co.; Robert Stoffan, United Illuminating Co.; W. L. Streich, Wisconsin Electric Power Co.

Also, C. R. Swenson, Massachusetts Electric Co.; W. H. Trudell, Merrimack-Essex Electric Co.; Spiro Vardakas, The United Illuminating Co.; J. D. Waldner, Edison Electric Institute; G. O. Werner, Northern States Power Co.; R. E. Wilson, Consumers Power Co.; M. I. Winter, Arkansas Power & Light Co.

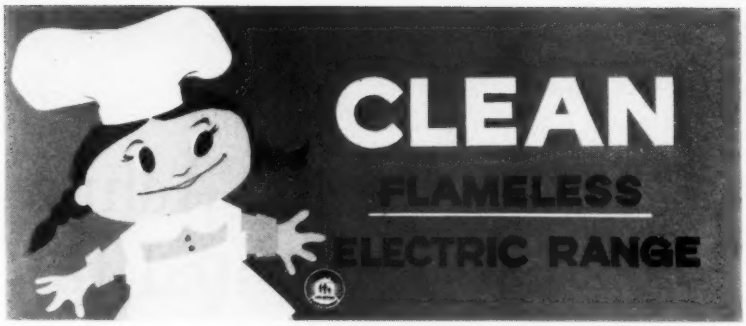
Grain Drying Manual Available from EEI

A NEW Grain Drying Manual is available from EEI.

The manual was prepared for use by vocational agriculture teachers, agricultural extension specialists, farm service representatives of power suppliers, and agricultural engineers. In compiling this manual, the EEI Farm Development Committee anticipated the problems that may be encountered in small grain drying, and has offered solutions.

The seven major sections of the manual contain information on such problems as: the economic advantages of grain drying with forced air, the fundamental principles of forced air drying, drying methods, drying with natural air, drying with supplemental heat, drying with heated air, and drying ear corn. These sections contain over 60 subdivisions relating to the subjects discussed. In addition the manual contains 21 tables and 33 figures showing valuable information related to the major divisions.

Copies of the new Grain Drying Manual are available at $2 each to EEI members, and at $2.75 each for non-members. They may be ordered from the Sales Division, Edison Electric Institute, 750 Third Avenue, New York 17, N. Y. Desired method of shipment should be specified.



Among the promotion kits to be distributed to LBE members in 1962 will be the material, right, in which "Dolly Flameless" puts across the LBE message. There will be three kits, one each for electric ranges, electric dryers, and electric water heaters.

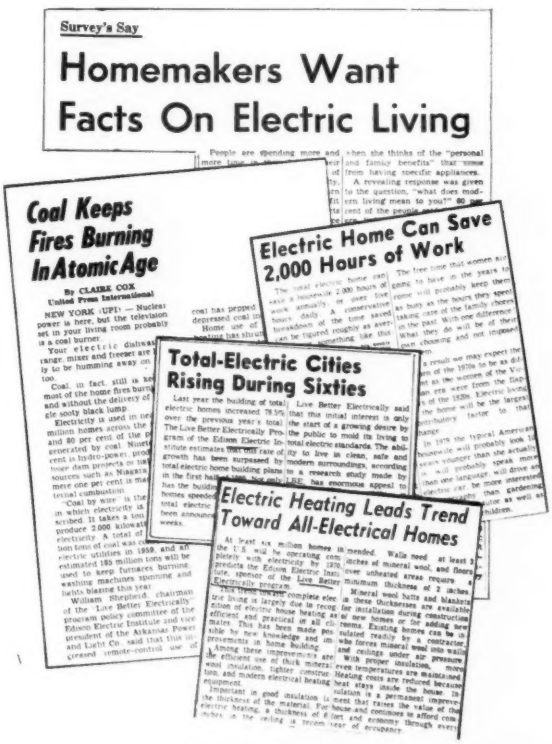
1962 LBE Program

(Continued from page 305)

Gulf States Utilities Co.; The Hartford Electric Light Co.; Home Light & Power Co.; Houston Lighting & Power Co.; Indianapolis Power & Light Co.; Interstate Power Co.; Iowa-Illinois Gas & Electric Co.; Iowa Power & Light Co.; Iowa Public Service Co.; Kansas City Power & Light Co.; Kansas Gas & Electric Co.; Kansas Power & Light Co.; Kentucky Utilities Co., Old Dominion Power Co.; Madison Gas & Electric Co.; Middle South Utilities, Inc., Arkansas Power & Light Co., Louisiana Power & Light Co., Mississippi Power & Light Co.; Minnesota Power & Light Co.; Montana Power Co.; New England Electric System, Attleboro Electric Co., Granite State Electric Co., Lynn Gas & Electric Co., Merrimack-Essex Electric Co., Mystic Power Co., Narragansett Electric Co., New England Power Co., Northampton Electric Lighting Co., Northern Berkshire Electric Co., Quincy Electric Co., Southern Berkshire Power & Electric Co., Suburban Electric Co., Weymouth Light & Power Co., Worcester County Electric Co.; Newport Electric Corp.; Northern Indiana Public Service Co.; Northern States Power Co. (Minn.), Northern States Power Co. (Wis.)

Also, Northwestern Public Service Co.; Ohio Edison Co., Pennsylvania Power Co.; Oklahoma Gas and Electric Co.; Orange & Rockland Utilities, Inc.; Otter Tail Power Co.; Patchogue Electric Light Co.; Pennsylvania Power & Light Co.; Philadelphia Electric Co., Conowingo Power Co.; Potomac Electric Power Co.; Public Service Co. of Indiana; Public Service Co. of New Hampshire, Kittery Electric Light Co., New Hampshire Electric Co.; Public Service Co. of New Mexico; St. Joseph Light & Power Co.; Savannah Electric & Power Co.; Sherrill-Kenwood Power & Light Co.; Sierra Pacific Power Co.

Also, Southern California Edison Co.; The Southern Co. System, Alabama Power Co., Georgia Power Co., Gulf Power Co., Mississippi Power Co.; Southwestern Electric Service Co.; Southwestern Public Service Co.; Superior Water, Light & Power Co.; Texas Utilities Co., Dallas Power & Light Co., Texas Electric Service Co., Texas Power & Light Co.; The Toledo Edison Co.; Union Electric System, Missouri Edison Co., Missouri Power & Light Co., Union Electric Co.; United Gas Improvement Co.; The United Illuminating Co.; Virginia Electric & Power Co.; Western Massachusetts Electric Co.; Wisconsin Electric Power Co., Wisconsin Michigan Power Co.; Wisconsin Power & Light Co., South Beloit Water, Gas & Electric Co.; Wisconsin Public Service Corp.


Survey's Say

Homemakers Want Facts On Electric Living

Coal Keeps Fires Burning In Atomic Age

By CLAIRE COX
United Press International

NEW YORK (UPI) — Nuclear power is here, but the television set in your living room probably is a coal burner.

Electric Home Can Save 2,000 Hours of Work

Total-Electric Cities Rising During Sixties

Electric Heating Leads Trend Toward All-Electrical Homes

These are some of the stories and features which have been carried in the national and local press on electric living. Publicity kits, distributed periodically by LBE, include press releases, radio and TV scripts, and glossy photographs.

Safety Achievement Awards Presented to 22 Companies

FROM May 1 through July 31 of this year EEI presented 34 Safety Achievement Award certificates to 22 member companies for achieving 1 million or more man-hours of operation without a serious accident.

Three companies were awarded certificates for achieving more than 3 million safe man-hours of operation. They were: the Production Department of Alabama Power Co.; the Purchasing and General Services Group of Potomac Electric Power Co.; and the Power Department of Southwestern Electric Power Co.

Eleven companies during this period reached the 2 million safe man-hour mark. Since the first of the year, 72 Safety Achievement Award certificates have been presented by the Institute.

The complete listing of certificates awarded in the May 1-July 31 period is as follows:

Alabama Power Co.
- Winfield District 2,000,249
- Production Department 3,422,648

Arkansas Power & Light Co.—
- Entire Company 1,039,900

Baltimore Gas and Electric Co.
- Electric Distribution Department—
  - Overhead Division 1,008,032
- Electric Operating Departments 2,061,169

Carolina Power & Light Co.—
- Entire Company 1,137,804

The Cincinnati Gas & Electric Co.
- Electric Production Department 2,000,000

Consolidated Edison Co. of New York, Inc.
- Purchasing and Stores Department—
  - Stores Bureau 2,000,000
- Outside Plant Construction Department—
  - Underground Bureau 1,000,000
- Westchester Operations 1,000,000

Consumers Power Co.
- Southern Region—Bulk Power Supply 1,017,751
- Battle Creek Division 1,014,881

The Detroit Edison Co.
- Customers Services Detroit Division—
  - Sales Department 1,001,776

Duke Power Co.
- Distribution Department 1,220,835

Duquesne Light Co.
- Operations Division—Transmission and
  - Distribution Department 1,132,062
- Power Stations Department—
  - Elrama Power Station 1,000,245

Florida Power Corp.
- Entire Company 2,077,305

Georgia Power Co.
- Columbus Division 2,072,015
- Entire Company 2,512,035

Gulf States Utilities Co.
- Entire Company 1,000,000
- Baton Rouge Division 2,000,000
- Lake Charles Division 1,000,000

Kansas Gas and Electric Co.
- Entire Company 2,078,028

Kentucky Utilities Co.
- Entire Company 1,647,868
- System Power Stations 2,001,122
- Central Division 1,010,896

Minnesota Power & Light Co.
- Power Department 2,641,351

Monongahela Power Co.
- Parkersburg Division—Transmission and
  - Distribution Department 1,214,658

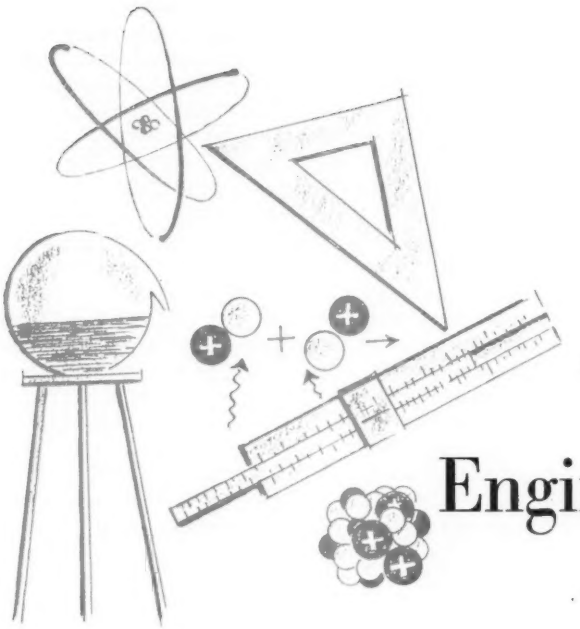
Northern Indiana Public Service Co.
- Electric Operations Department 1,000,000

Potomac Edison Co.
- Entire Company and Subsidiaries 1,004,132

Potomac Electric Power Co.
- Entire Company 1,005,700
- Purchasing and General Services Group 3,032,626

Southern California Edison Co.
- Fullerton EDS District 1,003,481

Southwestern Electric Power Co.
- Power Department 3,001,009



Trends in Engineering Education and Their Impact on the Power Industry

By K. L. Wheeler

Manager, Plant and Substation Engineering Department, The Cleveland Electric Illuminating Co.

IN the utility industry, people are probably the most important factor in our success. Our customers, our employees, and our stockholders are people. The legislative bodies with which we work so closely, the manufacturers from whom we purchase our equipment, and the newspaper and magazine editors who will determine the kind of "press" we receive are people. Among our employees, one of the most important groups of people is our engineers. That is why engineering education is so important.

Two years ago I discussed this subject in an address to the engineering managers and supervisors of Cleveland Electric Illuminating. In spite of the fact that I had done some reading in this area, I was somewhat overwhelmed by the mass of reading which was required to get an idea of the background and the direction which education is taking. I was more surprised to learn, in reviewing my past talk, of the number of changes which took place in the past two years, and the amount of reading required just to get up-to-date.

While trying to keep this material in a fairly logical form, I will obviously have a personal bias in any presentation of this nature. As a result, I wish to use the famous expression which is quoted on television and radio: "The views expressed by the speaker are not necessarily those of the sponsor."

The establishment of the United States Military Academy at West Point in 1802 provided the first engineering school in the United States. By 1854, there were nine engineering schools. The passage of the Morrill Land Grant College Act in 1862 and the rapid growth of industry in the United States following the Civil War greatly stimulated engineering education in this country. Engineering schools grew to 70 by 1872, to 85 by 1880, to 126 by 1918. In 1954, there were 210 of which 149 were accredited in at least one curriculum by the Engineers Council for Professional Development.

About a dozen years before the Civil War, the American engineering curriculum underwent a considerable change. In 1849, B. Franklin Green, Director of Rensselaer Polytechnic Institute, went abroad to study French technical schools. As a result, the Rensselaer curriculum, at first a one-year program, was expanded into a three-year program. Moreover, the French plan

Presented before the EEI Electrical System and Equipment Committee Meeting, New York City, May 16, 1961.

of teaching basic theoretical science and then showing how to apply it was transplanted without change to America, where it became the prevailing conception underlying curricula of our engineering colleges.

Perhaps it is fitting that a subcommittee of the Science Committee of the North Atlantic Treaty Organization, headed by M. Louis Armand, former President of the French Railways and former President of Euratom, has recommended, in 1960, an international institute comparable in size, scope, and quality to one of our leading Eastern engineering schools be established. The committee said that "although it is doubtful whether any single European country has the resources in manpower and money to proceed on its own, it is certain that Western Europe as a whole could easily muster the required talent and equipment."

Growth of Engineering Graduates

The growth in engineering graduates is shown by these figures: Prior to 1870, a total of 866 engineers had been graduated in the United States. After that date, however, there was a large increase in number —100 in 1870, 3,837 from 1881 to 1890, 17,000 from 1911 to 1915, and 28,273 in 1952-53. From 1959 through 1963, about 187,500, or an average of 37,500 per year, will receive bachelor degrees in engineering.

Through the early years, the engineering curricula apparently provided young engineers with the required training to fit them into the professional requirements of the times. However, in the early 20's, a number of engineering educators began a self-examination to see if they were doing an adequate job of teaching. As a result, in 1922 an elaborate survey of colleges offering engineering degrees was undertaken under the leadership of Dr. W. E. Wickenden, former president of Case School of Applied Science (now Case Institute of Technology). This survey, which lasted six years, was largely made through the questionnaire. The result of this survey was two volumes about the size of *The Standard Handbook for Electrical Engineers.* The final stupendous conclusion drawn was simply this: that there was nothing at all the matter with engineering education.

Some educators who had not been smothered by the Wickenden report began to see the need for courses in electronics, and institution after institution introduced them. A similar situation developed with regard to network theory. Some colleges had courses in electrical communications. During the 20's and early 30's, we can see the steady expansion of the scope of courses offered, and the requirement for new techniques. As a result, the dominance of the 60-cycle theory was at an end. Telephone and radio circuitry were being exploited, and a few clumsy demonstrations of television had already been made.

Looking at this primarily from the electrical engineering point of view, I think that there were a number of other reasons which started educators thinking about the content of their curricula. During the 20's and early 30's, the basic course in electrical engineering was the 60-cycle or power course. With the advent of the great Depression and the pressure on utilities developed by the Roosevelt Administration, the utilities found themselves with decreased load, decreased earnings, and the job of fighting for their lives. As a result, practically all of the engineering graduates that would have normally gone to work in the utility field were not hired. To quote Dr. G. S. Brown, Dean of Engineering at MIT:

"The decision was made not to develop any more captive engineers." To quote him further in a speech he made at the Winter General Meeting of AIEE in 1960: "As a result, many graduates of a modern four-year curriculum are capable of a career in any one of several industries. Industry, however, particularly the power industry, is less likely to find among four-year graduates the ready-made specialists it may need.

"The answers to the needs of specialization lie in more postgraduate work at universities, the offering of training courses by industry, and the offering of opportunities for engineers to obtain refresher instruction 'in an organized manner every five years or so.' "

In 1939 the Society for the Promotion of Engineering Education appointed a committee under the chairmanship of the late H. P. Hammond of Pennsylvania State College, which in 1940 submitted a "Report of Committee on Aims and Scope of Engineering Curricula." In 1944 another committee, also under Mr. Hammond, submitted to the same society a "Report of Committee on Engineering Education after the War." Both reports came up with approximately the same answer, namely that the curriculum should be divided into two parts—the scientific-technological and the humanistic-social. The reports further stated: "We believe that the humanistic-social requirements can be achieved only through a designed sequence of courses extending through the four undergraduate years and requiring a minimum of approximately 20 percent of the students' educational time."

World War II Void

During World War II, the engineering profession had to step into a serious void. It had to create and develop materials and equipment which had hardly been dreamed of before. It was learned during this period that those engineers who had a broader foundation were able to move into these areas and assume responsibility much more rapidly than those who had had the more classical education.

In 1952 the American Society for Engineering Education, the new name of the society, appointed a committee on evaluation of engineering education. In 1955 the final Grinter Report was issued. The summary of the final report says in part: "Engineering education must contribute to the development of men who can face new and difficult engineering situations with imagination and competence. Meeting such situations invariably involves both professional and social responsibilities."

The only way to do this, the committee emphasized, is by assuring genuine understanding of the compara-

tively few basic laws and principles underlying the basic sciences, and by emphasizing their extension to and application to the engineering sciences which form the bridge to professional engineering courses. Also, a greater emphasis must be put on that area known as the humanities. The committee supported the Hammond Report, recommending at least 20 percent of the curriculum hours be devoted to this area. Peter Druker put it well in a somewhat negative way: "A school can do a student no greater dis-service than to prepare him for his first job." Emerson stated it long ago: "Colleges can highly serve us where they aim not to drill, but to create."

In reviewing all the many engineering curricula, the committee's report differentiated six engineering sciences: mechanics of solids, mechanics of fluids, transfer and rate processes, thermodynamics, electrical sciences, and nature and properties of materials. Another committee was appointed in 1955 to prepare a more detailed report and give suggestions for the content of these six areas of knowledge. It is important to keep these six basic engineering sciences in mind as they will affect the future trends in engineering education.

Perhaps there were two considerations which influenced the committee's recommendations:

- Early scientific discoveries were born in a liberal arts atmosphere, not in the engineering schools.
- The rapidly increasing tempo of scientific and technological progress has created a demand for better understanding on the part of engineers and scientists of the social implications of their work and creations.

Present Trends in Engineering Education

As I have indicated, there is definitely a trend toward a greater expansion of teaching in the humanities and teaching basic sciences rather than technology. The most frequently required disciplines under the humanities are: economics, literature or scientific literature, history, including American history, and Western civilization. Social studies and political science are sometimes required.

There have really been two approaches to the inclusion of the humanities or liberal arts within the engineering curriculum. One has been to increase the amount of time given to the humanities within the four-year program. The other has been the so-called 3 and 2 plan where the student is not admitted to the study of engineering until he has completed three years of liberal arts training. Here the result in many cases is a degree both in arts and in engineering. The majority of engineering schools follow the first plan.

Included in this area of the humanities is the matter of communications. One English professor has said that "after all, any fool can learn English; some of them even teach it after graduation. Speaking well is a good deal harder to learn and some of us have become so entranced with the sounds of our own voices that we have never learned to listen. But in this counsel of perfection which I am outlining, the new professional engineer would be a master of reading, writing, speaking, and listening."

In the course of my research, I found an article by John Ryder, Dean of Engineering, Michigan State University. As some of us know, Dean Ryder is not a friend of 60-cycle teaching. He is one of the leading exponents of the present trend in engineering education. His ideas on the inclusion of physics within the engineering curriculum are essentially this: In the past, the physicist has been working in macrodimensions such as heat, electricity, light, and sound. Most physicists today, however, work on the mechanics of microdimensions dealing with the atom and its nucleus. It seems quite logical, then, that as the physicist moves out of the previous area, this field must be assumed by the engineer.

These comments are supported by the description of what engineers and scientists do, as published by the Engineers Joint Council: "Engineers plan, design, produce, maintain, and operate. Scientists make it known. Engineers make it useful."

Mathematics is another area which is going to receive a great deal more attention. Mathematics courses will be far more advanced than those which have been taught in the past. The use of computers in the rapid solution of mathematical equations will also be a tool in which the young engineer will be well-grounded.

Dr. J. M. Killian, former chairman of President Eisenhower's Scientific Advisory Committee and Chairman of the Corporation at MIT, said at the 1959 AIEE Winter General Meeting: "Other subjects formerly considered obstruse now have solid engineering applications."

In spite of these many changes in the content of engineering curricula, the heart of an engineering education is now, as it always has been, the learning of what has come to be called the engineering method. The method itself is not new. The new element is that mathematics and science are becoming more important tools. Learning to use these tools and learning the engineering methods are best done through intensive practice in solving realistic engineering problems. Even the study of the humanities, when properly taught, still induces the engineering question "why?"

Future Trends in Engineering Education

The trends which I have outlined are being carried out within the framework of the conventional engineering breakdown, such as civil, electrical, and mechanical engineering. The trend of the future seems to be in the direction of breaking engineering down into the six engineering sciences: mechanics of solids, mechanics of fluids, transfer and rate processes, thermodynamics, electrical sciences, and nature and properties of materials. This would be carried on with a greater emphasis on mathematics and on the humanities. Our engineering courses of the future then would look little like even our most modern courses today. Our student would graduate as a bachelor of

engineering or a bachelor of science. He would have no branch associated with his degree.

To again quote Dr. Brown from a recent article which appeared in the MIT Centennial Issue of the *Boston Globe*: "More than any other discipline, engineering is in a state of turbulent change.

"Achievements of engineers have not only caused revolutionary changes in their own profession, but they have instigated great change in the economic, the political, and the cultural environment of our whole world.

"The reappraisal of the role of engineering is occurring in the college, in industry, and in government.

"Its great heritage has bequeathed to it a compartmentalization of disciplines that present great obstacles to the efficient transfer of new ideas from scientists to engineers.

"Its professional society structure is fragmented and outmoded.

"Its teaching, curriculums, and facilities are captive of its great past in ways that retard progress.

"It has lost its popularity with a sufficient number of bright, purposeful youngsters to cause concern.

"This situation, bordering on complacency, has become critical.

"We have to attract into our ranks as engineers a fairer share of the bright, purposeful youths of our land—the uncommitted high school graduates, college freshmen or sophomores.

"We have to give these young men an engineering education which will qualify them to solve the problems of today and also equip them for the demands of the next decades—give them a versatility of mind and an ability to learn anew so that as professional engineers they will work at the frontiers of their field and bring forth new technologies, the very nature of which may be essentially unknown during the period of their formal education.

"In short, we have to equip an engineer with enduring knowledge and with the background and imagination to do things tomorrow which he doesn't even contemplate doing today."

Trend Indicated

To give some indication of the trend, I have two examples of engineering schools which are making specific changes in their curricula. Both the Case Institute of Technology and the Massachusetts Institute of Technology are breaking their courses down into engineering and science divisions. For instance, in the engineering division, students will soon be graduating with a degree in engineering, not an engineering degree in a specific field, such as electrical engineering.

This proposed approach would also have an effect on the graduate school. It would be in his graduate studies that the student would specialize in the present fields of engineering. It is interesting to note that more and more students, particularly those with the higher grades, are continuing on in graduate study. In the 1958-59 school year, 231 engineering schools gave 33,695 bachelor degrees; 144 institutions gave 6,615 master's degrees, and 714 doctor's degrees. While the curve has had a few dips in it, it appears that the number of students studying for advanced degrees is, in general, increasing.

Impact on the Power Industry

Before discussing the full impact on the power industry of both the present and future trends of engineering education, I think we have to ask a few very practical questions:

- How many of our engineering colleges will proceed with the new look? At present, MIT, Case, Cornell, Cal Tech, Purdue, Penn State, Michigan State, Carnegie Tech, and the University of Wichita are among those which have definitely moved in this direction. Probably the greatest strides have been made at MIT because it has been working at it longer. There will in the future, of course, be many more. However, out of some 200 engineering schools, it is questionable if 50 percent of them will move far in this direction.
- We are graduating perhaps 75,000 high school students each year who are capable of moving on into higher educational fields. Of these, probably not more than 35,000 will be interested in engineering or science. It is questionable if 20,000 of those interested will have the ability or inclination to study engineering under the new look.
- Our colleges are having a more and more difficult time finding adequate instructors. Under the new look, this will become an even more difficult problem.
- There is a higher percentage of the students at engineering schools who are taking physical science or management science rather than engineering. At Case, 50 percent of the undergraduates elect engineering courses as compared with 75 percent 10 years ago. Typical graduate school enrollment is about 40 percent in engineering and 60 percent in science. Similar trends are found elsewhere.
- There is expansion of the junior or community college and the technical institute programs. These are usually two-year programs. The former, in general, prepares a student to enter college at the junior year if he wishes, and is financially able. The latter prepares him to enter industry partially trained as an engineering technician. An excellent article entitled "The Engineering College and the Technical Institute of Tomorrow," by R. G. Ungrodt, appeared in the September, 1960, *Electrical Engineering*. The Engineer's Council for Professional Development has an accreditation program for these institutes. The National Society of Professional Engineers is considering recognition of the graduates on a semi-professional level.

It is obvious that, in putting a higher percentage of time in the curricula on fundamentals, mathematics, and the humanities, it is necessary to leave something out. This has been done by eliminating the so-called "hardware." Electrical engineers, for instance, are taught motor theory by the application of the fundamental principles of rotation at any frequency, and the

(Continued on page 320)

National Electrical Week in '62 Will Stress 'Electricity Powers Progress'

"ELECTRICITY Powers Progress" will be the theme of the 1962 observance of National Electrical Week, which is scheduled for Feb. 11-17, it has been announced by the National Electrical Week Committee in New York.

The announcement was made by H. A. Webster, President of the National Electrical Contractors Association and Chairman of the National Electrical Week Committee, following a meeting of the full committee.

Mr. Webster and the three officers who headed the 1961 NEW Committee all were re-elected to the 1962 Committee at the same meeting. They are: T. O. McQuiston, Vice President, Metropolitan Edison Co., who was re-elected Vice Chairman of the NEW Committee; A. W. Hooper, Executive Director, National Association of Electrical Distributors, re-elected Secretary; and L. W. O'Brien, Relations Services, General Electric Co., re-elected Treasurer.

In announcing the theme, Mr. Webster said: "The electrical industry intends to concentrate its efforts during the next National Electrical Week on informing our nation of the vital role electricity plays in our economy, our national defense, and our determination as a nation to improve the standard of living.

"The size of our country's electrical industry, our electrical output, and consumption make up one of the most significant yardsticks of our progress," he said. "More and more ways are being found to put electricity to work for us — in science, industry, research, on farms, and in the home. Electricity, possibly more than any other source of energy, is responsible for the high standard of living we now enjoy and for the great advances destined to take place in this decade.

"It staggers the imagination to envision our life without electricity," Mr. Webster said. "It is the lifeblood of our day-to-day living and the unlimited source of energy for tomorrow's advances. The NEW Committee believes that the theme, "Electricity Powers Progress," will help to drive home to all Americans—those in the electrical industry and the public at large—the importance and need for continuing growth of this giant force and industry, which contributes billions of dollars annually to the national economy."

For the 1962 NEW observance, the committee will again distribute planning guides and materials for nationwide and local observances of the Week. Last February, NEW activities were carried on in more than 300 communities in this country and in Canada. It is anticipated that this number will be surpassed in 1962 as a result of the now firmly established recognition of National Electrical Week as an important activity by the various segments that make up the electrical industry.

Mr. Webster said that many leagues, utilities, manufacturers, and others are already planning for the next observance. The early planning now going on substantiates the belief that there is increased interest and enthusiasm for National Electrical Week, he added.

Fleger to Address 54th PEA Meeting

THE opening session of the Pennsylvania Electric Association's 54th annual meeting in Philadelphia, Sept. 27-28, will be addressed by EEI President Philip A. Fleger, Chairman of the Board and President, Duquesne Light Co.

About 850 delegates from the association's 21 member companies are expected to attend the meeting, at the Bellevue-Stratford Hotel. R. G. Rincliffe, President of Philadelphia Electric Co., will open the meeting.

Headlining the Sept. 27 evening dinner program will be Dr. Kenneth McFarland, Educational Consultant to General Motors Corp. and the American Trucking Association.

Other speakers on Sept. 27 will be D. C. Van Meter, Vice President of N. W. Ayer & Son, Inc., and J. I. Lewis, Chief Counsel, Pennsylvania Public Utility Commission.

Speakers scheduled for Sept. 28 are: J. F. Miller, Managing Director of the National Electrical Manufacturers Association; Dr. G. P. Harnwell, President of the University of Pennsylvania and widely known atomic and nuclear physicist; Col. T. H. Setliffe, District Engineer, U. S. Army Corps of Engineers; and Bill Gove, nationally famous in business circles for his sales clinics and sales consultant work.

Officers of the PEA who will preside at the sessions are: G. R. Parry, President, Metropolitan Edison Co.; P. R. Lawson, Vice President, Pennsylvania Electric Co.; P. M. Alden, Vice President, Philadelphia Electric Co.; and C. S. Bowden, Vice President, Pennsylvania Power Co.

Trends in Engineering Education

(Continued from page 318)

laboratory experiments are carried out with single-phase motors or the universal machine.

As Harold Sharlin pointed out in "The Beginnings of Electrical Engineering," which appeared in the January, 1961, issue of *Electrical Engineering*: "Electrical engineering as a science dates from the second half of the 19th century. The development of the telegraph industry, with its technical problems that were overcome only through fundamental research in electrical phenomena, furnished the greatest impetus to the growth of the profession and the establishment of its professional societies." In one sense, we have come full circle from the telegraph to electronics and modern circuitry.

In mechanical engineering, where previously boilers, turbines, machine design, and mechanical drawings had been paramount in the instruction, they are now studying thermodynamics and the laws of motion. Programs in both areas are trending to the study of energy conversion as a whole.

Action Required by the Power Industry

I can state categorically that if the power industry is to remain a vital force in the American economy, it must get its fair share of the top engineering graduates of both the engineering schools who have turned to the "new look" in their curricula, and the engineering schools which have not. We need them for our many engineering tasks and also for our future top management jobs. We must provide for these men the challenging opportunities which they expect to get when they graduate. We must also provide the challenging jobs which will attract the men with advanced degrees, as well as those with the bachelor degree. These challenges must not only include job content, but starting salaries and advancement.

As Chairman, Sherman R. Knapp, President of The Connecticut Light & Power Co. and former president of EEI, told the American Power Conference in 1961, "Well-trained manpower of high caliber is essential to the utility industry to fulfill its responsibility to its customers and the public." The 1930 depression gap in hiring is beginning to catch up with the industry and the glamour industries are attracting most recent graduates, he said, adding that the utilities must arouse interest in the industry among both university faculties and undergraduates to meet this competition.

Where we were able in the past to obtain our graduates fairly well trained in 60-cycle theory and practice, we will, in the future, have to develop training programs almost equivalent to the type of study required for an advanced degree. This is going to be expensive and it is going to be time-consuming, but there is no other approach.

Perhaps our training needs can be met with a comprehensive program developed and administered by engineering schools located in various sections of the country. Management development programs, such as the Public Utility Executive Program of the University of Michigan, have been similarly conceived and carried out.

We will also have to do a better job of training the engineers we presently have with us. Here is a little item which I read in a publication of the Associated Industries of Cleveland:

"The 'obsolescence' of engineering personnel is becoming a real problem, according to Dr. Thomas Stelson of the Carnegie Institute of Technology. The engineering graduate of 10 years ago may find his skills obsolete unless he spends a good deal of his time on self-education; otherwise, he cannot hope to keep up with technological advances in industry or with the new developments in his own field.

"But even self-improvement may not be enough. Citing the mechanical engineer as a case in point, Dr. Stelson notes that high-speed computers, at a cost of 42 cents, can now solve problems that used to occupy a highly trained engineer for half a day. The answer to the problem, he believes, may well be in new developments in undergraduate training and increased emphasis on graduate education, better on-the-job training, study leaves, and exchange of ideas through professional societies."

As an example, the June, 1960, issue of the *Journal of Engineering Education* is largely devoted to computers in engineering education. It is of considerable interest that the computers they refer to are entirely digital. In the modern trend in engineering education, the analog computer has certainly taken a back seat. An indication of the effect of this on the utility industry is contained in the 1960 annual report of the American Electric Power Corp.: "High-speed scientific digital computers are rapidly becoming indispensable as tools to solve the ever-increasing complex engineering problems arising from the planning, designing, and operation of the system.

"During the past year, the digital computer completely replaced the network analyzer in carrying our system planning studies. This resulted in reduced engineering costs and, more important, increased substantially our ability to evaluate more quickly and more thoroughly the need for new facilities and to solve the associated technical problems required to meet future load growth. New mathematical techniques utilizing computers were also applied to analyzing our coal purchasing policies and to study hundreds of different variations in transmission line towers to determine design improvements."

Stimulation and Motivation

We must provide stimulation and motivation for our present engineers to continue their professional development. In 1950, A. C. Monteith, now Vice President of Engineering, Westinghouse Electric Corp., with a

distinguished committee of ECPD, brought out a program entitled "The First Five Years of Professional Development." These first five years are critical, not only to the power industry, but to the engineers working in the industry. We must stimulate our people to continue their study and their training long after they graduate. This again may be somewhat time-consuming and expensive, but without it we will find ourselves seriously handicapped in meeting the technological changes of the future.

We must also make greater use of the technical institute and community college graduates to supplement the activities of the graduate engineer. We must have the courage to recognize the difference between an engineer and a technician and see that each is permitted to grow in his own field.

New Recruiting Techniques Needed

I think it is important to note that the engineering which we were doing five and 10 years ago would not be acceptable to any of us today. It is also important to note that the engineering required 10 years from now will be far more challenging and at a higher level than it is today. To accomplish this, we are going to have to develop new recruiting techniques to make sure that we get men in the upper levels of their classes, not those exclusivly from the lower level. The utilities, in general, have built up an unfortunate reputation within the colleges of hiring only in good years.

We must continue to develop and expand our present programs in research and computer applications. The utility industry, through EEI, has been developing a research program and a computer program. These have provided a number of challenging areas for our engineers. It is my opinion that both of these areas must be given further attention and expanded. The computer is a logical and handy tool for the utility engineer, and as more and more of our engineers become trained in its application, we will find greater and expanded use for it. While, in general, the utility industry is not involved in pure science research, many of the engineering problems which we face and will face in the future will require engineering research which can well be carried on in our engineering schools, both to the benefit of the school and the utility industry.

There are some cheerful notes in the new look. For instance, those engineering graduates which we do get will have been trained to look at themselves as professionals. We will have to treat them as such. Also, in their new studies in the humanities, they are going to learn better use of the English language. They will be well grounded in the arts of listening, reading, writing, and talking. They will be able to present their ideas better orally and also in reports. We are going to get better staff work from these men than we do from many of the graduates which we have at present. With a little encouragement, they will present us with a complete engineering job.

John Weikart of the ESSO Research and Engineering Co. defines what they want in an engineering graduate: "We want a man who is well grounded in the fundamentals of engineering, science, and mathematics. Not only do we want it, but both the new engineers and the supervisors recognize it as a prime prerequisite . . . Good communications, both written and oral, are becoming increasingly important. The man must be a human being. He'll work with equipment, true, but he'll be in constant contact with his fellow man. We want good technical men, not machines. They must be socially responsible human beings, too.

"Wrap this all up and then lace it with enthusiasm, good work habits, and a continuing desire to learn, and you have what industry's personnel recruiters are seeking."

I think this is what we want in an engineer, too, since engineering is the profession in which a knowledge of the mathematical and physical sciences gained through study, experience and practice is applied with judgment to the known materials and forces of nature for the comfort, health, safety, and welfare of mankind.

Karl Taylor Compton, late president of the Massachusetts Institute of Technology, probably summed up my whole talk in this one short story:

"We cannot get far by trying to impose an engineering education, however excellent it may be, on a young man of mediocre ability or one temperamentally unfitted for technical or administrative work. The idea reminds me of an experience which my sister had in India. She had engaged a native electrician to install some new fixtures in her house, but he seemed particularly stupid and kept coming to her for instructions. Finally, in exasperation, she said to him: 'Why do you come asking questions all the time? Why don't you use your common sense?' 'Madam,' he replied, 'common sense is a rare gift of God. I have only a technical education.'"

Drumm Cited by Freedoms Foundation

S. L. DRUMM, president of West Penn Power Co., has been awarded a bronze medallion by the Freedoms Foundation at Valley Forge for an address he gave last year supporting American ideals.

At the presentation ceremonies in Pittsburgh, R. H. Foltz, Vice President of the Foundation, said:

"Mr. Drumm, a distinguished industrial leader, has made a special contribution in helping the public understand the economic principles which further the growth of America."

The address for which Mr. Drumm received the honor was made at the 1960 annual banquet of the Engineer's Society of Western Pennsylvania.

Insurance Committee Meeting

- *Trends in Group Insurance Field*
- *Boiler and Machinery Insurance*
- *Excess Liability Insurance Market*

R. R. MacKAY, JR.
Chairman

THE annual spring meeting of the EEI Insurance Committee was held at the Cavalier Hotel, Virginia Beach, Va., April 10-12, with 33 members present.

The report of the Subcommittee on Employee Benefits, with R. D. Constable as Chairman, discussed current trends in the group insurance field, with emphasis on the problems of medical insurance.

Fire Protection

The Subcommittee on Fire Protection, under the Chairmanship of C. R. Garton, reported on its activity in various phases of electric utility property protection. It announced copies of the report entitled "Fire Prevention and Protection in Hydrogen Systems for Generator Cooling," prepared by the Fire Protection and Prevention Task Force, would soon be sent to the committees.

R. H. Brandow, Chairman of the Subcommittee on Boiler and Machinery, announced revisions to the boiler and machinery insurance rating schedules and rates effective May 31.

Fire and Allied Lines

W. O. Randlett, Chairman of the Fire and Allied Lines Subcommittee, submitted a report discussing recent revisions to the inherent explosion clause, a new rewrite of the electric generating station rating schedule, and the current status of continuing discussions with the Inter-Regional Insurance Conference pertaining to proposed revisions to the electrical apparatus clause and further fire insurance rate credits.

The report of the Subcommittee on Mutual Assistance, which has J. W. Marrin as Chairman, highlighted the subcommittee's feeling that the solution to insurance problems which could arise through the interchange of employees under mutual assistance programs was largely dependent upon a general understanding of the responsibilities of both the borrowing and lending companies. Accordingly, a questionnaire was distributed to the committee members to correlate opinions as to the division of such responsibility.

H. S. Downing, Chairman of the Liability Subcommittee, submitted a report indicating a continued steadiness in the excess liability insurance market, coupled with a slow but increasing trend toward higher retentions and high limits of coverage.

The Subcommittee on Industry Practices, with A. L. Benjamin as Chairman, submitted a report containing up-to-date revisions of the subcommittee's study. This exchange of information now involves some 73 member companies.

The report of the Subcommittee on Nuclear Projects, with J. V. Anderson as Chairman, contained data dealing with the current status of nuclear liability insurance and government indemnity, and how the two will now supplement each other.

The meeting concluded with some discussion of recent losses of interest to the committee.

The next meeting will be held Oct. 30-Nov. 1, at The Tides, St. Petersburg, Fla.

FREQUENCY RATE
SAFETY AWARD
PRESENTED TO
_____ POWER & LIGHT COMPANY
IN RECOGNITION OF THE ACHIEVEMENT BY ALL EMPLOYEES ENGAGED IN ELECTRIC OPERATIONS IN
1960
OF THE LOWEST FREQUENCY RATE OF DISABLING WORK INJURIES IN THE GROUP OF MEMBER COMPANIES WITH
____ TO ____ EMPLOYEES

The Frequency Rate Safety Award, above, is now being presented by EEI to member companies within six classifications for maintaining the lowest disabling injury frequency rate. No application is necessary. The handsome bronze plaque, mounted on a polished walnut base, is sent automatically to the chief executives of the six qualifying companies. However, in order to qualify for the award, EEI member companies should submit their Annual Work Injury Statistical Report form to the Institute so that it is received by March 15 of the year following that for which the award will apply.

People in Power

SUTHERLAND DOWS, President of Iowa Electric Light and Power Co. since 1941, has been elected Chairman of the Board of the company. DUANE ARNOLD, Vice President and General Manager, was elected President.

Mr. Dows, who has been with the company for 47 years, will continue as chief executive officer.

Mr. Arnold has been with the company for 15 years. In 1950 he was made vice president in charge of operations. In 1954 he was promoted to vice president and general manager, and in 1960 he was elected a director of the company.

SUTHERLAND DOWS, JR., General Commercial Manager, has been elected a Vice President, and will be in charge of the commercial department. He has been with the company for 13 years and will be the fourth generation of the Dows family to serve the company in an executive capacity.

S. B. SMITH, who has been with the company for 26 years, most recently as Assistant Secretary, has been named a Vice President. In addition to various administrative duties, he will be in charge of all company real estate and insurance. He will continue to serve as vice president and secretary of the Cedar Rapids & Iowa Railway Co.

Vice President Vern Lear, who formerly handled commercial and sales activities, has been assigned the responsibility for area development and public relations, including employee information and other programs.

T. A. BROWN, President and General Manager of Madison Gas and Electric Co., has been named Chairman of the Board of the company, and E. R. FELBER, Executive Vice President and General Manager of the company, has been promoted to President.

Mr. Brown became president, general manager, and a director in 1958. He has served in various capacities, starting as a part-time student while attending the University of Wisconsin Engineering College, from which he received a degree in electrical engineering in 1923. He became vice president and general superintendent in 1946, succeeding to the position of vice president and general manager in 1958. In addition, he has served as the chief engineer of the company since the early 1930's. He is a Wisconsin registered professional engineer and has received citations and honors from the University of Wisconsin and professional engineering societies.

Mr. Felber is a mechanical engineering graduate of the University of Wisconsin and is a Wisconsin registered professional engineer. He joined the company as a cadet engineer in 1922, and has served in supervisory capacities in various departments, including the distribution, commercial, and sales departments. He became sales manager in 1929, and was elected vice president in 1936. In 1950, he was elected executive vice president. He has been a director of the company since 1939. Mr. Felber has been active in both gas and electric industry association work and is a past president of the Wisconsin Utilities Association.

A. J. NAQUIN, Safety Counselor for New Orleans Public Service Inc., and former chairman of the EEI Accident Prevention Committee, has been named a Fellow of the American Society of Safety Engineers. This honor, the first accorded by the society since its founding in 1911, was conferred on Mr. Naquin and seven others in recognition of their outstanding contributions to the safety engineering profession.

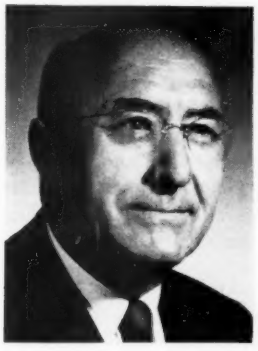
Mr. Naquin was an organizer of the Metropolitan New Orleans Safety Council and of the Louisiana Safety Association. In 1944 he was named president of the Delta Safety Society, and recently was the first recipient of the Browne-McHardy Award for distinguished service in the advancement of safety and loss prevention.

In addition to his numerous other safety organization affiliations, Mr. Naquin has been associated with the National Safety Council as general chairman of the transit section from 1946 to 1948, chairman of the Motor Transport Conference in 1960, and a member of the NSC board of directors in 1960. He was chairman of the EEI Accident Prevention Committee from June, 1951, to May, 1961.

SUTHERLAND DOWS

DUANE ARNOLD

T. A. BROWN



E. R. FELBER

ALBERT BAUER and V. N. HOOVER have been elected Vice Presidents of Pacific Power and Light Co., effective with the merger of California Oregon Power Co. into Pacific P&L.

Mr. Bauer, General Manager of System Operations, has been with Pacific P&L since 1955, when he became assistant chief engineer.

Mr. Hoover, Manager of the Wyoming division, was an executive with Mountain States Power Co. when it merged with Pacific P&L seven years ago.

FREDERIC COX, Western division (York) Manager of Metropolitan Edison Co., has been elected a Vice President of the company. Mr. Cox joined the utility 35 years ago, shortly after his graduation from Newark College of Engineering. Through a series of promotions, he became division manager of the Western division in 1956. A registered professional engineer, Mr. Cox is a member of the American Institute of Electrical Engineers. A member of the executive board of the York-Adams Area Council, he is also a vice president of the York County Industrial Development Council.

L. R. KNERR, Manager-Rates and Valuation, San Diego Gas & Electric Co., has been elected Vice President-Management Services. In addition to his present duties, he has assumed administrative and management functions relating to employee relations, purchasing, insurance, safety, and claims. Several of the new assignments were the responsibility of Hugh Stewart, Executive Engineer, who retired in August.

Mr. Knerr is well qualified for his new position, having held engineering positions with the Great Western Power Co. and Pacific Gas and Electric Co., before joining the California Public Utilities Commission in 1937. He has been with San Diego G&E since 1956.

E. H. DUNN, JR., Assistant General Counsel for Florida Power Corp., has been elected Vice President of the utility.

Mr. Dunn joined Florida Power's legal department in 1955. He was named assistant general counsel last year.

Three new vice presidents have been named by Puget Sound Power & Light Co. They are: J. F. WALLIN, Vice President in Charge of Operations; J. E. ANDERSON, Vice President, Finance; and R. M. DAVIS, who will continue as Secretary.

Mr. Wallin will be located in Seattle, where he succeeds E. A. FONTAINE, who resigned to return to Stone & Webster Service Corp.

M. R. LLEWELLYN, Manager of Gas and Electric Operations for Arizona Public Service Co., has been named a Vice President of the company. He will continue in his present position.

In 1947 Mr. Llewellyn joined an Arizona Public Service predecessor company, Arizona Edison, as general superintendent of operating and engineering.

M. H. GOLDEN, General Manager of Plymouth County Electric Co. since 1950, has been named Vice President of the company.

Mr. Golden has been in the utility business since 1926. He joined New Hampshire Gas and Electric Co. in 1936. He will remain as general manager of Plymouth County Electric, a subsidiary of the New England Gas & Electric Association.

O. L. SUNDSTROM has been appointed Assistant Operating Vice President of Central Illinois Light Co.

Mr. Sundstrom, who has been general superintendent of electric production and transmission for the past five years, has been associated with the company since 1924 in various operating capacities, including that of chief engineer of the R. S. Wallace Station on the Illinois River at Peoria.

A. H. DAVIS, Chief Engineer of the company's new E. D. Edwards Station, succeeds Mr. Sundstrom as General Superintendent.

W. T. REID, JR., who has been with the company since 1949, will become Chief Engineer at the Edwards Station.

E. D. EDWARDS, Chairman of the Board and President of Central Illinois Light Co., has retired.

He first joined the utility in 1923 as chief engineer of the Pekin Steam Electric Station.

After a series of advancements, he became vice president in charge of electric and heating operations in 1951, and was elected a director of the company in 1954. He was named president two years later. In 1960, he assumed the additional duties of chairman of the board, serving in this dual role until the annual meeting last March.

H. G. DILLIN, President, San Diego Gas & Electric Co., has been elected President of the Pacific Coast Electrical Association. He is presently serving as president, Pacific Coast Gas Association.

M. E. JUHL, President and General Manager of the Lake Superior Distric Power Co., has been installed as Chairman of the Board and President of the Wisconsin Utilities Association.

Colorado Utilities Plan to Consolidate

R. T. PERSON, President of Public Service Co. of Colorado, and J. W. Cryder, President of Colorado Central Power Co., have announced that the managements of the two companies have arrived at the general terms for a merger.

Detailed terms of the merger agreement are being prepared, and will be submitted to the boards of the two companies. Upon completion of the merger, the surviving corporation will be the PSC of Colorado.

It has long been recognized in the area that such a merger is a logical step in supplying the best possible service to customers in the respective service territories of the two companies. Public Service Co. has supplied the generating requirements of Colorado Central Power Co. at wholesale, and has provided natural gas service in many localities served electrically by Colorado Central Power. Combining of these two operations into one company will provide many opportunities for economies and improved service which will accrue to the benefit of the customers.

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